Department of Natural Resources

ECOLOGICAL LANDSCAPE ANALYSIS CENTRAL LOWLANDS ECODISTRICT 630

PART 3: Landscape Analysis for Forest Ecosystem Planners

ELA 2014-630

NOVA SCOTIA

Ecological Landscape Analysis, Ecodistrict 630: Central Lowlands

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This report, one of 38 for the province, provides descriptions, maps, analysis, photos and resources of the Central Lowlands Ecodistrict.

The Ecological Landscape Analyses (ELAs) were analyzed and written from 2005 – 2009. They provide baseline information for this period in a standardized format designed to support future data updates, forecasts and trends. The original documents are presented in three parts: Part 1 – *Learning About What Makes this Ecodistrict Distinctive* – and Part 2 – *How Woodland Owners Can Apply Landscape Concepts to Their Woodland.* Part 3 – *Landscape Analysis for Forest Planners* – will be available as a separate document.

Information sources and statistics (benchmark dates) include:

- Forest Inventory (1995) – stand volume, species composition
- Crown Lands Forest Model landbase classification (2006) – provides forest inventory update for harvesting and silviculture from satellite photography (2005), silviculture treatment records (2006) and forest age increment (2006)
- Roads and Utility network – Service Nova Scotia and Municipal Relations (2006)
- Significant Habitat and Species Database (2007)
- Atlantic Canada Data Conservation Centre (2013)

Conventions

Where major changes have occurred since the original ELA report was written, the new information will be provided in *italics,* so that the reader can see how some conditions have changed since the benchmark date of the ELA.

REPORT FOR ELA 2014-630

Table of Contents – Part 3

Tables

Appendices

Theme Maps Available on Website

Part 3: Landscape Analysis of Central Lowlands – *For Forest Ecosystem Planners*

This in-depth Ecological Landscape Analysis (ELA) report is a lightly edited version of the original ELA produced by the Department of Natural Resources (DNR) as an internal document to assist with Crown land planning. The report provides information for planners, forest managers, ecologists, technicians, and woodland owners seeking detailed planning resources. In coming years the DNR will continue to develop landscape planning approaches and introduce additional tools to support sustainable management and biodiversity conservation. The Department is working with stakeholders to explore novel planning approaches using these methods.

The ELA provides tools to recognize and pursue common goals for sustaining ecosystem values across all ownerships within the province's diverse landscapes. The ELA is not a plan, but instead supports planning by providing a framework of ecosystem mapping, indicators, fine-scaled features, and landscape functions that help describe landscapes as ecological systems. The report comprises the four major sections outlined below, along with theme maps and appendices containing detailed data summaries:

Understanding the Landscape as an Ecological System

- Elements Within Landscapes
- Flow-Element Interactions
- Landscape Connectivity

Landscape Indicators

- Forest Composition Indicators
- Land Use Indicators

Fine Scale Features

- Priority Species and Other Special Occurrences
- Rare Ecosections
- Ecological Representivity

ELA Summary

- Element Interpretation
- Ecosystem Issues and Opportunities

Understanding the Landscape as an Ecological System

(Appendices 1, 2a, 2b; Map 2)

Landscapes are large areas that function as ecological systems and respond to a variety of influences. Landscapes are composed of smaller ecosystems, known as elements, which were interpreted through analysis using the ecosection layer of the Ecological Land Classification (ELC) for Nova Scotia. Elements are described by their potential vegetation (e.g. climax forest type) and physical features (e.g. soil, landform). These characteristics help determine historical vegetation patterns and promote an understanding of present distributions and potential habitat

development. Across the province about three dozen elements were identified in the ELAs and mapped to show their distribution across ecodistricts and ecoregions.

Elements Within Landscapes (Map 2)

The landscape analysis identified and mapped 10 distinctive elements in the Central Lowlands Ecodistrict – one matrix, eight patches, and a corridor. A matrix is the dominant element. Patches are smaller yet still distinctive elements. Corridors are natural linear elements, such as river valleys, that extend across ecodistricts (see connectivity section for full discussion of matrix, patch, and corridor concepts).

Red and Black Spruce Hummocks is the matrix element, representing 40% of the ecodistrict. Red and black spruce are the main species. White and red pine form a significant component, indicating a history of disturbances by fire.

Tolerant Hardwood Hills, representing 27% of the ecodistrict, is the largest patch element. This element supports shade-tolerant species of the Acadian Forest, such as sugar maple, yellow birch, beech, red spruce, and hemlock.

The other patch elements, in order of size, are **Tolerant Mixedwood Hummocks**, **Spruce Pine Flats**, **Floodplain**, **Wetlands**, **Marshes and Grasslands**, **Salt Marsh**, and **Tolerant Hardwood Drumlins and Hummocks**.

Valley Corridors is a linear element associated with the main rivers in the ecodistrict, including the Musquodoboit, Shubenacadie, Stewiacke, Kennetcook, St. Croix, and St. Andrews.

Comparisons with the current conditions determined that much of the ecological structure has been altered within the ecodistrict.

Red and Black Spruce Hummocks is still the dominant element; however, it is less extensive than in the past, due primarily to agriculture, human settlement, and harvesting.

Approximately 40% of the entire ecodistrict is in the establishment and young development classes, with early and mid seral species of red maple, grey birch, white birch, balsam fir, and white spruce dominating.

The main corridors follow the major river systems of the Kennetcook, Nine Mile, Musquodoboit, Stewiacke, Shubenacadie, St. Croix, Walton, Meander, Cogmagun, Avon, and Herbert rivers. These rivers provide many of the linkages to the Minas Basin and Central Uplands, Rawdon / Wittenburg Hills, Eastern Interior, and Minas Lowlands ecodistricts.

The forests within these corridors, most notably along the mouth of the St. Croix and the Kennetcook along with the Shubenacadie from Riverside to Gays River and the Stewiacke from the Fort Ellis area to Cloverdale, have been significantly altered by human settlement, agriculture, transportation and utility systems, and forestry (Map 2).

Flow – Element Interactions (Appendix 1; Map 2)

Flow phenomena are the features that move across and through landscapes. They can be energy or material, living or non-living. Diaz and Apostol (1992) suggest that the most relevant flows for landscape analysis may include water, wind, fire, animals, plants, and humans. The following flows were considered in the analysis of this ecodistrict and are described in Appendix 1: salmon, wood turtle, shorebirds, eagles, bats, deer, yellow lady's slipper, and people.

As an example of this flow – element interaction, eagles that use the area along the Shubenacadie River for habitat, nesting, and feeding also require a fairly large special management zone along the river for perching and hunting.

The lower reaches of the Shubenacadie River has been altered significantly and now most of the eagles are located toward the mouth of the river. The goal would be to restore areas along the river corridor and encourage a mixedwood forest of all seral stages. Another goal is to maintain the special management zones in the upper reaches of the river system.

The main purpose in describing flows and their relationship to the elements is to provide insight into the role of each element. This will inform understanding of each element's contribution to overall landscape function.

Landscape Connectivity (Appendices 2a, 2b; Map 2)

Connectivity refers to the ease or difficulty that resources, such as water, animals, or even events – such as fires – can move within an area. As a basic ecological requirement, the ability to move without excessive risk is of critical importance for maintaining biodiversity at all levels, including genetic, individual, species, population, community, and ecosystem.

River corridors promote connectivity.

Connectivity takes many forms and operates at a wide range of scales. Among the structural ecosystem components that support movement, three major systems can be identified:

Matrix Ecosystems – Matrix implies large areas of broadly similar habitat in which movement is not constrained to particular routes. The slow spreading and mixing of species through the dominant community characterizes the ecosystem matrix. This "percolation" is dependent on the large patch conditions, which may be vulnerable to fragmentation. Interior habitat is often an important feature of matrix ecosystems.

Patch Ecosystems – The movement of species among patches of suitable habitat is dictated by the arrangement and size of patches and by a number of species' specific

measures. Patches of suitable habitat must occur at acceptable distances over time. Some patch

habitats have critical functions and must be continuously sustained, such as wetlands for migrating birds, feeding areas for deer, and calving grounds for moose. Other patches may be dynamic, shifting about the landscape as ecosystems evolve. Edge and interior habitat conditions are important features of patch ecosystems, as well as natural isolation.

Linear Corridor Ecosystems – Flow along popular routes is dictated by enduring physical features, such as river valleys. Linear flow often requires continuous connection, such as rivers. Breaks in the connection serve as obstacles. It is a characteristic of continuous linear features that they often serve as connective corridors for some species and barriers for others.

Central Lowlands is now dominated by a much changed structure that does not represent the inherent natural conditions that once characterized this landscape. Human land use, transportation systems, and utility corridors have fragmented most of the element types, reducing the connective function of the corridors for some species and may also increase the barrier effect of the corridors for species that must move across (Map 5).

An additional concern inherent in all ecological planning is the maintenance of connectivity among conservation areas (including wilderness, old growth, provincial parks, and ecological reserves) that are often not ecologically related. At the landscape scale of planning, connectivity among these areas is supported by the dominant forest structure.

Connectivity will be sustained by applying the natural disturbance regime (NDR) guidelines for landscape composition (Table 7) and recognizing natural linkage opportunities.

Opportunities to improve connectivity and implement connective management strategies include:

- Mitigating the potentially negative barrier effects of concentrated land use in the Valley Corridors element by sustaining and restoring natural communities in key areas.
- Enhancing connectivity among conservation areas by applying appropriate medium and high biodiversity emphasis standards when managing areas with natural linkage potential.
- Improving ecoregional connectivity by sustaining and restoring natural conditions at important linkage points among ecodistricts.

Links to Neighbouring Ecodistricts (Appendices 1, 2a; Map 2)

All of the landscape flows are identified with major linkages to adjacent areas or ecodistricts (Map 2). The hydrological system provides the most obvious physical connection among the Central Lowlands, Minas Basin, Central Uplands, Rawdon / Wittenburg Hills, Eastern Interior, and Minas Lowlands ecodistricts. These river systems occur throughout the four watershed areas of the Kennetcook, Colchester, Shubenacadie-Stewiacke, and Musquodoboit.

Deer move out of the higher elevations in winter down through the Stewiacke watershed and into their wintering areas along the Stewiacke Valley.

People provide many linkages throughout the entire ecodistrict into adjoining ecodistricts through their many activities of recreation, transportation, fishing, hunting, forest management, utilities development, and settlements.

Future land management activities should recognize the significant linkages to those neighbouring ecodistricts and manage to enhance and sustain connectivity.

Landscape Indicators (Appendices 3, 6, 7, 8, 9, 10, 11; Maps 3, 4, 5, 9, 10)

Indicators provide standard measures for assessing landscape conditions. Indicators can be used to develop goals, identify priority actions, assess trends, and support the evaluation of scenarios.

Forest Composition Indicators (Appendices 8, 10; Maps 4, 9, 10)

Managing landscapes for biodiversity requires a variety of planning approaches and tools. Sustaining forest composition diversity by reflecting natural patterns of disturbance and succession is one approach that DNR is employing to try and realize this objective. A number of additional approaches and planning tools are being developed which will be integrated with objectives defined in the ELA protocol.

Human activities, such as forest harvesting, can shape the structure and composition of the forested landscape and should be planned to help support landscape composition goals.

At a landscape planning scale, the variety of habitats can be broadly described in terms of the composition of development classes, seral stages, and covertypes.

Development class indicators describe changes in structure and process as forests age and trees grow larger. For landscape management purposes, four development classes are recognized:

- forest establishment (0 to 6 m height)
- young competing forest (7 to 11 m height)
- mature forest (> 11 m height; including multi-aged and old forest)
- multi-aged / old forest (multiple layered / Old Forest Policy)

Seral stage indicators describe changes in species composition of forest communities as succession progresses from domination of early seral “pioneer” species following disturbance, toward late seral communities dominated by long-lived, shade-tolerant “climax” species. Seral stage is dependent on the composition of tree species of a forest, irrespective of age. For landscape management purposes, three seral stages are recognized:

- early (seral score 10 to 23)
- mid (seral score 24 to 37)
- late (seral score 38 to 50)

A look-up table (see Appendix 8) assigns each species in the forest inventory a value from one to five representing its position on the successional scale. These values are applied to the species composition data in the forest inventory to calculate a seral score, which may range from 10 to 50.

Covertype indicators further refine landscape composition by distinguishing forests of different community conditions. Management generally recognizes three forest covertypes:

- softwood (overstory cover of softwood species is 75% or more)
- hardwood (overstory cover of hardwood species is 75% or more)
- mixedwood (overstory cover of either softwood or hardwood is between 25% and 75%)

Target Ranges for Composition Indicators

Table 7 provides target ranges for development class and seral stage composition appropriate for different disturbance regimes. These ranges have been derived from the professional judgment of DNR forest ecologists to guide composition objectives for large landscape areas. This guidance can be used to assess how land holdings contribute to the overall ecodistrict structure by referring to the element analysis section which summarizes the levels of these indicators.

A full description of definitions and mapping of Nova Scotia's disturbance regimes is contained in the report "Mapping Nova Scotia's Natural Disturbance Regimes" available from the DNR website (http://novascotia.ca/natr/library/forestry/reports/NDRreport3.pdf).

Table 7 - Landscape Composition Target Ranges (by Development Class / Disturbance Regime)

Natural Disturbance Regime	Development Class			
	Forest Establishment	Young Competing Forest	Mature Forest (including multi-aged and old forest)	Multi-aged and Old Forest
Frequent Stand Initiating	5 - 30%	5 - 30%	>40% early, mid, and late seral representation	>8%
Infrequent Stand Initiating	5 - 20%	5 - 20%	>60% most in mid and late seral stages	>16%
Gap Replacement	0 - 15%	0 - 15%	>70% most in late seral stage	>24%

Forest Vegetation Types for Seral Stages in Each Element

Each element contains a number of forest stands that can be classified by vegetation, soil, and ecosites. The DNR publication ***Forest Ecosystem Classification for Nova Scotia, Part I: Vegetation Types (2010)*** (http://novascotia.ca/natr/forestry/veg-types/veg-navigation.asp) is helpful in identifying forest plant communities. Table 8 presents a description of the vegetation types likely to be found within elements, along with the current percentage of each seral stage.

Table 8 – Forest Vegetation Types[1] Within Elements in Central Lowlands

Element	Seral Stage					
	Early	% *	Middle	%	Late	%
Red and Black Spruce Hummocks	IH1, IH2, IH4, IH6, MW5, OF1, OF2, OF4, OF5	19.0	MW4, SH5, SH6, SH8, SP4, SP6, SP8	30.0	SH1, SH2, **SH3, SH4, SP5,** SP7	24.0
Spruce Pine Flats --- Floodplain ecosite	IH1, IH4, IH6, OW1, OW2, OW4, SP1, SP2, SP10 --- FP4, FP5, FP6	16.0	MW4, SP3, SP4, SP6, SP8 --- FP2, FP3	26.0	**SP5**, SP7, SP9 --- **FP1**	39.0
Tolerant Mixedwood Hills	IH3, IH5, IH6, OF1, OF2, OF3, OF4, OF5	33.0	MW2, MW4, SH5, SH6, SH8	30.0	**MW1, MW3,** SH1, SH3	16.0
Tolerant Mixedwood Hummocks	IH3, IH5, IH6, OF1, OF2, OF3, OF4, OF5	33.0	MW2, MW4, SH5, SH6, SH8	29.0	**MW1, MW3,** SH1, SH3	16.0
Tolerant Hardwood Drumlins and Hummocks	IH3, IH4, IH5, IH6	19.0	IH7, TH8	21.0	TH1, **TH2, TH3,** TH4,	16.0
Floodplain --- Spruce Pine ecosite	OF1, OF2, OF4, OF5, FP4, FP5, FP6 --- IH1, IH4, IH6, SP1, SP2, SP10	23.0	FP2, FP3 --- MW4, SP3, SP4, SP6, SP8	27.0	**FP1** --- **SP5**, SP7	28.0
Salt Marsh	Grasslands of Spartina spp.					
Marshes and Grasslands	Cultivated Fields and Freshwater Wetlands (cattails, willows, alders, WC, WD)					
Wetlands	WC1, WC2, WC3, WC4, WC5, WC6, WC7, WD1, WD2, WD3, WD5, WD6, WD7, WD8					

View forest groups and vegetation types at
http://novascotia.ca/natr/forestry/veg-types/veg-navigation.asp
To help with identification of vegetation types, the 14 forest groups in Nova Scotia designated by DNR are: Cedar (CE), Coastal (CO), Flood Plain (FP), Highland (HL), Intolerant Hardwood (IH), Karst (KA), Mixedwood (MW), Old Field (OF), Open Woodland (OW), Spruce Hemlock (SH), Spruce Pine (SP), Tolerant Hardwood (TH), Wet Coniferous (WC), Wet Deciduous (WD)
Bolded vegetation types indicate typical late successional community
[1] Forest Ecosystem Classification for Nova Scotia (2010)
*Percentage of element in each successional stage. Percentages may not total 100 due to unclassified lands (such as clearcuts and regenerating stands) not being included.

Land Use Indicators (Appendices 3, 4, 5; Maps 6, 7)

Two indices (Ecological Emphasis Index and Road Index) have been developed to measure the relative pressure that current human land use exerts on ecosystems.

Ecological Emphasis Index (Appendices 11, 12; Map 3)

A variety of land management practices occur across landscapes, ranging from natural reserve areas to highly modified urban environments. Conserving biodiversity requires a balancing of land use practices to sustain ecological integrity.

To assist in assessing land use intensities and develop appropriate practices, four levels of ecological integrity are defined based on the degree that the conservation of natural conditions is emphasized in the management practices and policies applied to the land:

- Reserve, such as parks or wilderness areas
- Extensive, which are lands managed or restored for multiple values using ecosystem-based techniques
- Intensive, optimizing resource production by management techniques that may reduce biological diversity, such as plantations; but also meet the Wildlife Habitat and Watercourses Protection Regulations (NSDNR, 2002)
  (See http://www.gov.ns.ca/natr/wildlife/habitats/protection)
- Converted, lands altered for agriculture, roads, or other human activities

All lands within the ecodistrict are assessed at the stand level and assigned one of these four ecological emphasis classes (EEC) based on past practices. These classes are mapped over all areas of the landscape using a one hectare grid. The Ecological Emphasis Index (EEI) is determined by assigning a weighting value to each class: Reserve (100), Extensive (75), Intensive (25), and Converted (0). An overall index value may be calculated for any area of interest, such as element, ecosection, ecodistrict, or ecoregion, by averaging the index values within the area to provide a relative indication of land use pressure.

The 270,250 hectares within the Central Lowlands Ecodistrict are inherently capable of supporting approximately 194,825 hectares of forest, with remaining lands being non-forest ecosystems such as lakes, wetlands, and barrens.

The overall EEI for Central Lowlands is 50 to 60 (Appendix 12b). This is a relatively low EEI and suggests the intensity of land use may be of concern as far as its impacts on biodiversity.

The extensive EEC is the most common, accounting for 58% of the ecodistrict. Lands in this category are managed for multiple values using ecosystem-based techniques that conserve biodiversity and encourage natural ecosystem conditions and processes.

An additional 3% of these lands fall in the intensive EEC and are intensively managed to optimize resource production from sites maintained in a native state (e.g. forested). Despite intensive practices, these lands are an important component of landscape structure and composition. Management may eliminate or reduce the duration of some development processes, particularly mature old forest stages, and may result in non-natural succession, produce unnatural conditions such as exotic species, old field spruce, and monoculture plantations, or reduce structure and composition below ecologically desirable levels.

Other lands are split between the reserve class (1%) and the converted class (19%). The remaining 19% of land is unclassified.

The reserve class is divided into two categories: legal reserves and policy reserves.

The converted lands are those areas that have been altered by human settlement, farming, urban development, and transportation and utility corridors. These converted lands are predominately located around the major river corridors, villages, and towns. These lands are given a zero ecological emphasis index class in their present state, but some locations, especially along the river corridors, show opportunity for restorative measures to the predicted climax stands of spruce, elm, sugar maple, and white ash.

DNR will continue to develop and evaluate other measures of conservation risk.

Road Index (Appendices 6, 7; Map 5)

The GIS-based "Road Index" provides a standard assessment and mapping of road distributions across ecodistricts to assist planners to objectively explore options for managing road networks and assess the intersection of road affects with other features of the landscape. Density, distance, and type of linear feature (e.g. road types, power lines) are used to calculate index values that indicate relative road pressure. The index value is mapped over all areas of the landscape using a one hectare grid. The overall index may be calculated for any area of interest, such as element, ecosection, ecodistrict, or ecoregion, by averaging the index values within the area to provide a relative indication of land use pressure. The index provides a numerical indicator of road influence that can be used to monitor temporal changes and compare different landscapes.

In discussing road ecology, Forman (2004) describes five distinctive landscape types in North America: city-suburb, agricultural, forestry, arid-grassland, and natural landscape. Each landscape type has a characteristic pattern of road networks with distinctive ecological effects and planning considerations (Forman & Hersperger 1996). These were adapted in Nova Scotia to classify five Road Index Benchmark Ranges associated with particular land use settings:

- Remote Landscape (RI 0 to 6): Unpopulated with few roads, trails, or other linear features
- Forest Resource (RI 7 to 15: Forest access roads are the primary linear feature
- Mixed Rural (RI 16 to 24): Mixed land use of rural settlement, forestry, and agriculture
- Agriculture/Suburban (RI 25 to 39): Suburban settlement and/or open agricultural fields
- Urban (RI 40 to 100): Urban environment with high building densities, roads, and few tracts of undeveloped land outside municipal parks

Road, trail, and utility corridors are vital components of human land use. However, transportation systems are expensive and produce many undesirable environmental effects, such as chronic siltation, invasion routes for exotic species, fragmentation, loss of productive land, and increased human presence.

Low road density areas are important features for biodiversity conservation. Planning should consider block scheduling options, life expectancy, class requirements, decommissioning

strategies, and overall landscape function, in order to develop efficient access systems designed to minimize environmental impacts.

Currently, Central Lowlands has an overall RI value of 13 (Appendix 7, Table 3). This average falls within the Forest Resource Index range of 7 to 15 and maybe described as moderately low. Only 11 percent of the ecodistrict has a Remote RI of 0 to 6 (Appendix 7, Table 2). Sixty-three percent of the ecodistrict area has road indices in the Forest Resource and the Mixed Resource and Rural Settlement categories.

The highest RI densities occur around settlements, towns, and main transportation systems. The Agriculture Suburban and Urban categories account for 26% of the ecodistrict.

High RI values occur in numerous areas because of the number of river corridors and human settlement, contributing to habitat fragmentation.

Opportunities for road and trail improvements include:

- Conserving the relatively low road densities within the matrix (RI of 9) through strategic scheduling of new access and decommissioning where possible. Private woodland owners may be able to decommission select roads and share access.
- Scheduling accessing systems for regular maintenance or decommissioning, particularly where connectivity or additional reserves are to be established.
- Utilizing old abandoned trails or logging roads before additional recreational trails are established.
- Seeking to improve the distribution and connectivity among the few low road density areas, especially near Walton Barrens, Clarksville, and Georgefield. This may improve connectivity between natural areas and linkages to neighbouring ecodistricts.

Fine Scale Features (Appendices 3, 4, 5; Maps 6, 7)

Data on the status and location of priority species, ecological land classification, representivity analysis, and other landscape characterization themes were used to identify special occurrences, rare ecosections, and ecological representivity. These fine scale features, which occur at a sub-landscape level, may require special management practices to conserve their uncommon characteristics.

Lindenmayer and Franklin (2002) refer to the importance of identifying “midspatial-scale” features and “patch-level habitats,” including: 1) aquatic ecosystems, such as streams, lakes, and ponds; 2) wildlife corridors; 3) specialized habitats, such as cliffs, caves, thermal habitats, meadows, and vernal pools; 4) biological hotspots or places of intense biological activity, such as calving sites, over wintering grounds, and spawning habitats; and 5) remnants of old forest.

Priority Species and Other Special Occurrences (Appendix 3; Map 6)

Landscapes and ecosystems comprise many species of plants, animals, and other organisms. Some of these species are given priority in planning, management, and stewardship because they are rare,

and/or at risk of going extinct locally or on a larger scale. The status and location of these species are important and data are collected, compiled, and assessed on an ongoing basis.

The primary species data used in this report are from the Atlantic Canada Conservation Data Centre and DNR's Significant Habitat Database. Efforts are made to ensure data are as accurate and up-to-date as possible. Lists and maps indicate what is currently known. Due diligence tied to planning, management, and stewardship may require that surveys be carried out to update information or to fill gaps in our knowledge. Priority species may require special actions in terms of forest management and other activities that alter habitat and the landscape. If more information is required or if management specific to a priority species need to be developed, a regional biologist, Wildlife Division staff, or other species experts should be contacted.

This section includes species at risk (refer to Table 1a, Appendix 3), species of conservation concern (Table 1b, Appendix 3), other conservation features (Table 1c, Appendix 3), and heritage features (Table 1d, Appendix 3, where available). *The list of species at risk and species of conservation concern was obtained from the Atlantic Canada Conservation Data Centre (ACCDC) databases, current to 2013*.

Species at Risk

The term "species at risk" is generally used to describe those species that are, to some extent, protected under provincial or federal endangered species legislation. Usually these species are protected where they occur on provincial, federal, and private lands. In Nova Scotia, the two main pieces of endangered species legislation are the Nova Scotia Endangered Species Act (NSESA) and the federal Species at Risk Act (SARA). Species can be classified as "endangered," "threatened," "vulnerable/special concern," or as "extinct" or "extirpated." In most cases for species at risk, recovery planning and special management are in place, as well as legal protection (see http://novascotia.ca/natr/wildlife/biodiversity/at-risk-overview.asp).

Species of Conservation Concern

The term "species of conservation concern" refers to those species that are a high priority for conservation and special attention during planning, management, and stewardship. These species may be rare and/under a variety of threats but the threats do not currently warrant species at risk designation. In some cases these species could meet the criteria for a species at risk but a formal species at risk assessment has not been done. Species of conservation concern are a priority in landscape planning because a focus on them now can prevent these species from becoming species at risk later.

Species Ranking and Coding Systems

A number of ranking and coding systems identify and convey the status of species at risk and species of conservation concern. Some of this information is provided in Appendix 3 and Map 6 and is routinely used in planning, management, and stewardship activities.

Colour-coded “traffic light” systems are used provincially and nationally. These systems use “red to orange/yellow to green” categories to indicate the most at risk species (red) to the least at risk species (green). Details of these systems are available from the Wildlife Division.

A second system commonly used is NatureServe Conservation Data Centre system. This system uses numbers from one (extremely) to five (widespread, abundant) to denote the relative rarity and conservation concern for species. At the provincial scale numbers are prefixed with “S” to indicate that this is a state/provincial level rank. Ranks at the National (N) and Global (G) levels are also available for all species. In Nova Scotia, the Atlantic Canada Conservation Data Centre (http://www.accdc.com/) works with partners to provide ranks and data on species’ occurrence.

Old Forest

The Interim Old Forest Policy requires a minimum of 8% of Crown land within each ecodistrict be identified and protected. The stands are selected to provide representation of landscape elements with the best old forest and old forest restoration opportunities. *In 2012, DNR released an updated Old Forest Policy, containing new integrated resource management (IRM) decision-making procedures (see http://novascotia.ca/natr/library/forestry/reports/Old-Forest-Policy-2012.pdf).*

As of 2013 in Central Lowlands, there are documented occurrences (under the NSESA) of the following number of formally listed species: nine endangered, four threatened, and four vulnerable. In addition to the listed species, the National General Status process also identifies one red-listed species, 49 orange-listed species, 72 yellow-listed species, 58 green-listed species, one extirpated, and 11 undetermined species for a total of 192 other species of conservation concern in this ecodistrict.

Designated species at risk found within the Central Lowlands Ecodistrict include four species of fish (Atlantic sturgeon, American eel, striped bass, and Atlantic salmon), pygmy pocket moss, black ash, eastern white cedar, monarch butterfly, and skillet clubtail, three species of mammals (little brown myotis, northern long-eared myotis, eastern pipistrelle), ram’s-head lady’s slipper, brook floater, wood turtle, and several bird species (red knot, chimney swift, olive-sided flycatcher, eastern wood-pewee, bobolink, rusty blackbird, peregrine falcon, barn swallow, bank swallow, and Canada warbler).

Other species of conservation concern known for the Central Lowlands Ecodistrict include semipalmated sandpiper and common loon (birds); light beaked moss and tufted fen moss (bryophytes); marsh bellflower, fringed blue aster, and blue cohosh (dicots); Acadian quillwort and rock spikemoss (ferns and their allies); ocellated darner and bog elfin (insects); valley oakmoss lichen and woodland owl lichen (lichens); triangle floater and eastern lampmussel (mollusks); short-awed foxtail and Canada lily (monocots); and the four-toed salamander (amphibians).

Birds

As of 2013, 10 species of birds found to be present in the ecodistrict are designated at risk. Nine of these are listed under the NSESA: red knot (*rufa* ssp), chimney swift, rusty blackbird, barn swallow, and Canada warbler as endangered; olive-sided flycatcher as threatened; bobolink, eastern wood-pewee, and peregrine falcon (*anatum* ssp) as vulnerable.

Nationally, five species are listed under SARA: chimney swift, olive-sided flycatcher, and Canada warbler as threatened; and rusty blackbird and peregrine falcon (*anatum* ssp) as special concern.

COSEWIC has designated all ten species: red knot (*rufa* ssp) as endangered; olive-sided flycatcher, chimney swift, bobolink, barn swallow, bank swallow, and Canada warbler as threatened; and eastern wood-pewee, rusty blackbird, and peregrine falcon (*anatum* ssp) as special concern.

Generally, there has been a nationwide decline in aerial insectivores, which are commonly attributed to a decline in flying insects. Most likely the population decline is influenced by multiple causes, such as habitat loss, change across the landscape, and a decline in insects.

The chimney swift historically nested in large hollow trees which they still do today, but they also prefer abandoned chimneys that maintain a constant temperature. Chimney swifts have undergone a significant decline in the last several years that is not well understood but likely involves habitat changes, pesticide application, and a change in insect populations.

The olive-sided flycatcher prefers spruce and fir swamps and bogs with open water. This species has experienced long-term declines attributed to habitat loss in wintering grounds, a decline in insects, and climate change.

Eastern wood-pewee can be found in deciduous forests typically along the edges and clearing with closed canopy and open understory conditions. This species has declined over the past few decades and almost exclusively feeds on flying insects. The decline in population is most likely attributed to a combination of loss of habitat in the wintering range, current forestry practices, and climate change.

The bobolink is associated with large open grasslands and hayfields. Declines are due to mortality from agricultural practices, habitat loss and fragmentation, and bird control methods.

The bank swallow has shown a decline over the past number of years. These swallows nest in exposed bank faces that include river banks, hardened sawdust piles, coastal bluffs, and gravel pits. Declines are attributed to loss of nesting, breeding, and foraging habitat.

Barn swallows have declined across North America since the 1980s. These swallows nest at artificial sites such as barns, under bridges, culverts near farmlands, marshes, lakes, and rural areas. The loss of important artificial nesting substrates and changes to farming practices may be implicated with population declines.

The Canada warbler has shown significant declines over the past few decades. These warblers can be found to occupy a variety of different habitat types but prefer mixed forests with dense undergrowth. Population declines are not well understood but habitat loss in the wintering range is most likely a significant influence.

The rusty blackbird breeds and nests in areas of dense coniferous forests near wetlands or streams. This species has experienced a slow, steady long-term decline and the cause is not well understood

but is likely due to habitat changes and blackbird control programs in agricultural landscapes in the wintering grounds.

The red knot is a shorebird that breeds in Arctic Canada and winters in South America. These birds migrate thousands of kilometres between the breeding grounds and wintering areas. This subspecies has shown a 70% decline in abundance over the past 15 years. They have a stopover in Nova Scotia during migration to feed on horseshoe crab eggs which is a critical food source. The primary cause of decline is attributed to the depletion of this food source. There have been a few occurrences documented along the shores of the Minas Basin in this ecodistrict.

The peregrine falcon (*anatum*) is a medium sized raptor that nests on steep cliff ledges along the coast and feeds almost exclusively on birds. Populations declined across North America with the falcon almost disappearing because of the use of DDT, which was banned in the 1970s. A reintroduction program initiated in the 1970s, along with the DDT ban, has seen populations increase. These raptors may be observed from time to time in this ecodistrict.

Bryophytes

Pygmy pocket moss is designated by COSEWIC as special concern but have no provincial or federal listing. In the Central Lowlands, there are three documented occurrences near the western boundary of the ecodistrict. Pygmy pocket moss has a limited documented population in Canada with the majority occurring in Ontario. This moss is typically found in woodlands, primarily on disturbed clay soils.

Dicots

In 2013, black ash was listed under the NSESA as threatened. There are an estimated 1,000 individuals and only 12 mature trees in the province. In the Central Lowlands there are several occurrences across the ecodistrict of mostly isolated young trees; however, there are a few reports of sites with one to three mature trees.

Gymnosperms

Only one species at risk is documented for the Central Lowlands Ecodistrict: eastern white cedar. In 2006, eastern white cedar was listed under NSESA as vulnerable; only 32 stands are identified provincially. The population is fragmented and comprises small stands that appear genetically separate from each. This species is typically found in riparian areas, woodland forests, and old pastures, preferring nutrient-rich, cool, moist habitats. In the Central Lowlands Ecodistrict, one site is documented near the western boundary.

Fish

Atlantic sturgeon is designated by COSEWIC as threatened but it has no provincial or federal listing. It is a long-lived, anadromous species that feeds primarily on worms, crustaceans, mollusks, small fish, and aquatic insects. Threats to this species include commercial fisheries,

habitat loss and degradation, and pollution in freshwater and marine environments. Although uncommon, Atlantic sturgeon still makes use of the Shubenacadie River system.

The Inner Bay of Fundy Atlantic salmon population has steadily declined over the last 20 years and has been designated as endangered by COSEWIC and protected under the federal Species at Risk Act. The decline in Atlantic salmon is not well understood but evidence suggests that low marine survival is a primary cause which may be due to ecological changes in the Bay of Fundy. Other threats to this species include environmental contaminants, habitat loss and degradation, lack of riparian buffers along waterways, water passage obstruction, and lack of pools. Historically, Atlantic salmon have utilized the Shubenacadie River for spawning and continue to make some use of available river habitat.

Striped bass is designated as endangered under COSEWIC but has no provincial or federal listing. Historical evidence identifies striped bass spawning in five rivers in Eastern Canada. Currently, however, spawning only occurs in two known rivers: Miramichi and Shubenacadie. The Shubenacadie River currently supports a relatively stable population. Perceived threats to the population include changes in water quality and flow, by-catch from commercial fisheries, and competition from introduced species (such as chain pickerel).

The American eel is widespread in eastern Canada, but has experienced declines over a significant portion of its distribution and therefore was designated in 2012 as threatened by COSEWIC. Threats to this species include habitat alteration, dams, harvest, environmental changes, and parasites. The American eel is an important component of aquatic biodiversity, has the greatest range of any North American fish species and has supported commercial, recreational, and Aboriginal fisheries. The American eel can be found in many of the rivers and lakes in this ecodistrict.

Insects

Monarch butterflies are designated by COSEWIC and listed under SARA as special concern but have no provincial designation. These butterflies are grouped with the milkweed butterflies of the family *Danaidae*, which also includes the viceroy. The monarch is the most common of this group, occurring throughout the U.S. and Southern Canada, and it is also one of the few butterflies that are migratory. Monarch habitat in Nova Scotia includes fields, meadows, abandoned farmland, and roadsides that have a presence of milkweed. Monarchs will only lay their eggs on the leaves of milkweed, which is the primary food for the developing caterpillars. The monarch may occasionally be observed in the Central Lowlands Ecodistrict.

Skillet clubtail is designated by COSEWIC and listed federally as endangered. This rare species of dragonfly is currently only found in three locations in Canada and prefers clean, large, medium to slow running rivers with sand, silt, or clay bottoms. The adult dragonfly deposits eggs in the water and it takes at least two years for the larvae to develop before it emerges as an adult. Emergence typically occurs toward the end of June with the adults leaving the water and likely moving into the forest. Recent surveys indicate that there are likely only three rivers in New Brunswick that have the only populations in Canada. One historical occurrence is documented on the Shubenacadie River. Limiting factors and threats include anthropogenic habitat change, water quality change,

eutrophication due to excessive nutrient input from sewage, sedimentation (agriculture, forestry runoff), invasive species, and predators.

Mammals

In 2013, the little brown myotis, northern long-eared myotis, and eastern pipistrelle were listed under the NSESA as endangered. The population level of these species has experienced an alarming decline due to a disease known as white-nose syndrome caused by the fungus *Pseudogymnoascus destructans*. This disease has killed nearly 7 million bats in eastern North America in the past eight years and estimates of a 90% decline in Nova Scotia over three years. Currently, there is no known cure for the disease which affects all bats that hibernate in caves and abandoned mines during the winter. There are several documented hibernation sites in the Central Lowlands Ecodistrict, often associated with old mine workings and cave environments, with past species records.

Mollusks

Only one species of mollusk species at risk is documented for the Central Lowlands: brook floater. In 2013, this freshwater mussel was listed under the NSESA as threatened with only five known locations in the province. The brook floater prefers shallow rivers or streams with a moderate to high water flow. Occasionally brook floaters have been found to occur in small lakes with sandy bottoms. Threats to this species include changes to water quality and quantity, often the result of shoreline development, sedimentation, and agricultural practices. Brook floater occurrences in Central Lowlands are associated with the Shubenacadie River system.

Monocots

The ram's-head lady's slipper is listed as endangered under the NSESA and has no designation or listing under COSEWIC or SARA. It is a small, herbaceous, perennial, orchid found in open forest with cool soils and a neutral pH. In Nova Scotia, the ram's-head lady's slipper has only been found in Hants and Cumberland counties and is associated with gypsum bedrock and sinkholes. Threats to this species include loss and destruction of habitat due to gypsum mining, forestry, agriculture, and development. Competition with exotic species, OHV disturbance and collection by humans are also potential threats. Currently, there are several known areas in the Central Lowlands Ecodistrict, near the Windsor area, where the ram's-head lady's slipper is documented.

Reptiles

Wood turtle is designated by COSEWIC as threatened and listed under the federal SARA and NSESA as the same. The Musquodobit watershed provides significant habitat for wood turtle in this ecodistrict, notably the Little River tributary. Other watersheds with wood turtle occurrences include Shubenacadie, Walton, Kennetcook, and Herbert rivers.

Rare Ecosections (Appendices 3, 12b; Map 7)

Table 9 – Elements, Ecosections, Disturbance Regimes and Climax Types

630 Central Lowlands Ecodistrict

Landscape Element and Type	Ecosections*	Dominant Natural Disturbance Regime	Dominant Climax Type
Red and Black Spruce Hummocks (Matrix)	IFHO IFRD IMHO IMRD PFHO	Frequent	red Spruce (rS), black Spruce (bS)
Tolerant Mixedwood Hills (Patch)	ICHO IFKK WCKK WFKK WMKK	Infrequent	rS, eastern Hemlock (eH), white Pine (wP), sugar Maple (sM), yellow Birch (yB)
Tolerant Mixedwood Hummocks (Patch)	WFHO WFRD WMHO WMRD	Infrequent	rS, eH, wP, sM, yB, Be
Spruce Pine Flats (Patch)	ICSM IFSM WCHO	Frequent	bS, wP
Floodplain (Patch)	IMSM WCSM WFSM	Gap	American Elm (aE), sM, white Ash (wA)
Wetlands (Patch)	WTLD	Open Seral (Frequent)	bS, red Maple (rM)
Marshes and Grasslands (Patch)	DKLD	Open Seral (Frequent)	N/A
Salt March (Patch)	XXMS	Open Seral (Frequent)	*Spartina spp.* (cordgrass)
Tolerant Hardwood Drumlins and Hummocks (Patch)	IFDM WFDM	Gap	sM, yB
Valley Corridors (Corridor)	Various	Various	Various

***Ecosection Explanations**: For example, in **WMHO**, **W** stands for Well-drained under Soil Drainage **M** stands for Medium-textured under Soil Texture and **HO** stands for Hummocky under Topographic Pattern

Soil Drainage: **W –** Well-drained **I –** Imperfectly drained **P** – Poorly drained **WTLD** – Wetland

Soil Texture: **C** – Coarse-textured soils (e.g. sands) **M** – Medium-textured soils (e.g. loams) **F** – Fine-textured soils (e.g. clays)

Topographic Pattern: **SM** – Smooth or flat **KK** – Hills **HO** – Hummocky **DM** – Drumlinoid **RD** – Ridges **DS** – Canyons and steep slopes

The Ecological Land Classification for Nova Scotia (Neily et al. 2003) classifies ecosections based on similar characteristics of landform, soils, and vegetation. These are the smallest mapped unit, and they repeat within ecodistricts. Ecosections have characteristic natural disturbance regimes and climax types.

Landscape elements were identified by combining ecosections with similar characteristics. Table 9 provides explanations of ecosections and their relationship to elements. Ecosections that are rare (< 2% of ecodistrict area) or under high land use pressure (> 75% land conversion) are identified in Appendix 3.

Twelve of the 24 ecosections – DKLD, ICHO, ICSM, IFDM, PFHO, WCHO, WCKK, WCSM, WFDM, WFRD, WFSM, and WMRD – each comprise less than 2% of the ecodistrict (Appendix 3, Table 2 and Map 7).

With the exception of the DKLD, the elm-sugar maple-white ash within the WCSM and WFSM has the highest land use pressures within both the ecodistrict and ecoregion with more than 56% of the area converted to human settlement, agriculture, and other development activities.

The DKLD ecosection is approaching 75% conversion to other uses. Old growth stands have been identified on some 2,192 hectares, or 5% of the Crown lands under the Old Forest Policy (Appendix 5).

Additional representation is required in a number of these community types. Present opportunities may be limited in the red spruce-eastern hemlock-white pine community because of Crown ownership or the high conversion in other communities, such as black spruce-white pine.

Opportunities for future management to address fine filter conservation issues include:

- Conserving uncommon forest species for which genetic viability may be threatened as indicated by DNR's Endangered Species Rating System.
- Fine filter management opportunities related to conservation of significant habits.
- Uncommon community conditions (e.g. old age, large live and dead trees, and species associations). Increase representivity in the uncommon old forest communities.
- Implement restorative measures in those community types like elm, sugar maple, and ash stands along the river corridors or the jack pine, black spruce, and white pine where conversion to other species or uses are high.

Ecological Representivity (Appendices 4, 5)

Ecological representivity describes the degree that the range of natural ecosystem diversity (elements, ecosections) is secured within reserve systems (e.g. Parks, Wilderness, Old Growth Policy).

The overall goal is biodiversity conservation through protection of natural habitat diversity. Ecological representation is employed as a "coarse scale" ecosystem planning concept. The analysis evaluated and identified the reserve status of the ecosections and climax communities located within the ecodistrict where two levels of reserves were recognized: legally protected

reserves, such as wilderness areas; and policy protected reserves under the IRM classification to include old forest, Eastern Habitat Joint Venture Sites, non-designated provincial park reserves, and non-designated sites of ecological significance.

In Central Uplands, policy reserves include 2,192 hectares under the Old Growth Policy, 195 hectares in designated provincial parks and reserves, 109 hectares in non-designated parks and reserves, and one hectare in private lands under the Nova Scotia Nature Trust (Appendix 5).

Legal reserves include 44 hectares in sites of ecological significance, 35 hectares in non-designated parks and reserves, 30 hectares in Crown and private protected beaches, 10 hectares in designated parks and reserves, and 4 hectares in wilderness areas.

Since provincial Crown lands only represent 16% of the ecodistrict, opportunities to improve representation should be directed to private lands in the form of participating in programs and working with organizations such as the Nature Conservancy of Canada and Nova Scotia Nature Trust.

Priority sites and strategies to improve representation could include:

- Conservation of uncommon or rare climax community types of sugar maple-yellow birch-red spruce or sugar maple-yellow birch-beech that are less than 2% in ecodistrict and ecoregion.
- Conservation of additional old forest area in the black spruce-white pine, red spruce-hemlock-yellow birch, sugar maple-yellow birch-beech, sugar maple-yellow birch-red spruce.
- Improving connectivity among the wetlands and river corridors.

ELA Summary

Element Interpretation (All appendices and maps)

The Central Lowlands Ecodistrict encompasses much of eastern Hants, southern Colchester, and parts of Halifax counties.

A significant feature of this central lowland is the several large tidal rivers that are influenced by the Bay of Fundy. The only exception is the Musquodoboit River, which drains to the Atlantic Ocean.

Most of the ecodistrict is fairly level with hummocky to undulating topography, with elevations seldom exceeding 90 metres above sea level. The climate is conducive to farming and the area has been extensively used for dairy and beef production and the growing of forage, corn, and soybeans.

This ecodistrict is underlain by Carboniferous era shale, limestone, sandstone, and gypsum. Karst topography – sometimes indicated by sink holes – is common on areas underlain by gypsum.

Glacial outwash deposits, some of which have been quarried for aggregate, are abundant, especially along the rivers. However, most of the ecodistrict has deep, reddish-brown, fine-textured soils comprising loams, silts, and clays. The drainage is restricted on most of the soils due to glacial compaction, clay content, or level topography.

Large peat lands are dominant on the level terrain associated with the watersheds of the Walton, Cogmagun, and Tomcod rivers. Adjacent to these peat lands are extensive areas of imperfect to poorly drained forests underlain by an impermeable clay loam till.

A few freshwater lakes dot the ecodistrict, but when added to the streams and rivers the total area is only 3,976 hectares, or less than 2% of the ecodistrict.

The forest cover is influenced by the predominant moist soils, many of which are fine-textured and support coniferous forests of black and red spruce, white pine, hemlock, and earlier successional forests of white birch, red maple, and aspen.

Many of the soils experience a moisture deficit in the summer which creates opportunity for fires to create ecosystems of black spruce, red pine, and white pine.

On the better-drained hills, late successional climax forests of mixed Acadian Forest species such as yellow birch, red spruce, hemlock, beech, and sugar maple will occur. Hemlock is found predominantly on steeper slopes near streams and rivers.

On sites where soils are derived from the glacial outwash till, white pine will occupy the coarser soils.

An unusual association is the occurrence of red pine with black spruce on the imperfectly and poorly drained clay soil that is prominent on the smooth topography of the watersheds of the Tomcod and Cogmagun rivers.

Pure stands of tolerant hardwood species are uncommon. Beech does not form a significant component of many forests.

The fine-textured intervale soils of the major rivers have been used extensively for farming and natural forests of American elm, white and black ash, and sugar maple are now rare. Several examples of these intervale forests can be found along the Meander, Herbert, and Kennetcook rivers. Rare and uncommon plants such as showy lady slipper, blue cohosh, and bloodroot are also common in these scattered remnants.

Much of the ecodistrict is underlain by calcareous materials (limestone, gypsum, and anhydrite) of the Windsor Group. On these sites, forests of hemlock, white pine, red oak, and tolerant hardwood species will be common. These sites will also have rare and uncommon plants such as ram's head lady slipper, yellow lady's slipper, bladder fern, leatherwood, and shepherdia.

Abandoned farmland in the ecodistrict tends to reforest with a variety of species, including white spruce, white pine, tamarack, and occasionally white ash, red maple, aspen, and white birch.

Natural disturbance agents in the ecodistrict are primarily associated with hurricanes and fire.

The large area of poorly drained soils in the ecodistrict is due in part to a compacted till and the gentle lay of the land. During the summer months these soils dry quickly and forests are more susceptible to fire. Later in the fall the soils become saturated and forests are subjected to blowdown due to the shallow rooting of the softwood species. The suppression of fire in this ecodistrict may lead to the absence of red pine in the future.

Insect defoliation has not been a significant factor in forest disturbance, although the spruce budworm was present in the early 1970s creating patchy defoliation throughout the eastern portion of the ecodistrict. The balsam wooly adelgid is currently damaging and causing mortality. Only colder winter temperatures (-30°C) will reduce its impact on the forests. The beech bark canker, introduced in the 1890s, has reduced the beech to an understory species although scattered disease-free individual trees can be found.

An increase in average annual temperature due to global warming may have significant impact on forest composition, possibly increasing the abundance of black spruce and balsam fir. Soil moisture may not change since precipitation amounts are not expected to decrease with climate change. However, the frequency and extent of natural disturbances such as fires caused by lightning and the blowdown of large forested tracts by hurricanes may increase.

Red and Black Spruce Hummocks
(Matrix) (IFHO, IFRD, IMHO, IMRD and PFHO ecosections) (106,775 ha)

This matrix element comprises 40% of the ecodistrict and is characterized by imperfectly drained fine-textured soils that support a coniferous forest of red and black spruce, white and red pine, hemlock, and earlier successional species of white birch, aspen, and red maple.

Although the element is found throughout the ecodistrict, it is more prominent east of the Shubenacadie River.

The matrix is now more fragmented, with only 24% of the forest that have community types of late seral stages of red and black spruce and white pine.

Fourty-nine percent of the forest is in the early and mid seral stage with a higher percentage of balsam fir, red maple, white and grey birch, and aspen. Approximately 15% of this matrix element is dominated by intolerant dominated mixedwood stands.

The EEI is 56 to 68 indicating a fairly high land use pressure and conversion within the element (Appendix 12b). These index ratings are fairly consistent across the ecoregion for ecosections (IFHO, IFRD, IMHO, IMRD, and PFHO) (Appendix 3, Table 2).

Flows

Salmon (spawning, habitat, water catchment); wood turtle (feeding, habitat); bats (summer habitat, feeding, resting); deer (habitat); people (hunting, fishing, exploration, harvesting).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006) **Composition of Red and Black Spruce Hummocks**				
Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	37%	13%	50% (34 Mat + 16 OF)	16%
Seral Stage	Early	Mid	Late	Unclassified
	19%	30%	24%	27%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	56%	8%	30%	6%

Desired Condition

A softwood-dominated matrix of spruce and scattered pine with small inclusions of hardwoods on the knolls and better-drained areas. There should be a variety of development classes associated with the two disturbance regimes but a high percentage (60%) of the forest should be in the mature development class.

Issues

- an additional 2% of the Crown lands is required to be set aside under the Old Growth Policy for the black spruce-red pine-white pine community and the red spruce community type
- forty-nine percent of this patch type is in the early and mid seral stage
- only 34% of the forest is in the mature development class
- change of covertype to a more softwood-dominated mixedwood forest with intolerant hardwood species making up the hardwood component
- increased conversions to other uses: farming, transportation corridors

Tolerant Mixedwood Hills

(Patch) (ICHO, IFKK, WCKK, WFKK and WMKK ecosections) (71,998 ha)

This is the largest of all the patch elements comprising almost 27% of the total ecodistrict. It is characterized by imperfectly drained knoll and knob type topography with red and black spruce, hemlock, and scattered yellow birch in the lower lying areas.

In the higher better-drained locations the tolerant hardwood of yellow birch, sugar maple, and ash can be found. This patch type is more prominent in the Shubenacadie, Gays River, and Stewiacke areas.

This element is more fragmented because of the extensive transportation systems, utility corridors, agriculture, and increased development.

Red and black spruce still dominate on the imperfectly drained areas, but balsam fir and intolerant hardwoods of white birch, red maple, and aspen form a higher percentage of the current forest.

Early and mid seral stage species now account for 63% of the forest. Only 39% of the forest is in the mature development class. Twenty-one percent of the forest is unclassified.

The EEI is 49 to 57. The low EEI can be contributed to high conversion and a less area in the reserve status (Appendix 12b).

The area converted to other uses is much higher for ecosections within this ecodistrict compared to the same ecosections in the region (Appendix 3, Table 2).

Flows

Salmon (some minor movement in the Gays, West St. Andrews, and Shubenacadie rivers - mostly striped bass, gaspereau, and shad), wood turtle (feeding, habitat); eagles (nesting and feeding mostly along the Shubenacadie River system); bats (summer habitat - feeding, resting; deer (habitat); people (agriculture, hunting, fishing, exploration, and harvesting).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)

Composition of Tolerant Mixedwood Hills

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	33%	15%	52% (39 Mat + 13 OF)	13%
Seral Stage	Early	Mid	Late	Unclassified
	33%	30%	16%	21%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	45%	13%	34%	8%

Desired Condition

A large patch element that is dominated by a late seral, mature, coniferous forest of red/black spruce, hemlock, and scattered yellow birch located on the lower imperfectly drained soils with inclusions of tolerant hardwoods of sugar maple, yellow birch, and ash located on the higher, better-drained, course-textured knolls.

Issues

- representation under the Old Forest Policy indicates that additional area is required for the sugar maple-yellow birch-beech community as well as the black spruce community
- twenty-one percent of this element is unclassified
- conversion to other uses exceeds 20% for most of the ecosections within this element
- early and mid seral stage accounts for 63% of the present forest
- only 39% of the forest is in the mature development class
- current forest is changing from a softwood and hardwood covertype to more mixedwood

Tolerant Mixedwood Hummocks

(Patch) (WFHO, WFRD, WMHO and WMRD ecosections) (37,637 ha)

This patch element is a composition of many medium to large fragmented areas scattered over the western two-thirds of the ecodistrict. The area is characterized by fine to medium-textured well-drained soils, hummocks, and smaller ridges that support red and black spruce, sugar maple, yellow birch, balsam fir, and intolerant hardwood mixedwoods.

The largest intact area is located around the Falmouth to Woodville area.

There has been a significant change in the forest compared to the inherent conditions. The current forest has more mixedwood covertype that is dominated by red maple, white birch, grey birch, and aspen and less sugar maple and yellow birch.

The hardwood covertype has increased from 4% in the inherent to 18% under current conditions. These hardwoods are dominated by the intolerant red maple, birch, and aspen.

Only 16% of the forest in the late seral stage and 39% in the mature development class. Sixty-two percent of the forest is in the early and mid seral stage.

The low EE1 of 43 to 51 is a result of very high conversions (29%) and less than 1% of the land identified for reserves. Conversions within these ecosections are even higher in the ecoregion than at the ecodistrict level.

Flows

Salmon (catchment, nutrients, filter); wood turtle (important feeding - habitat zone 1); shorebirds (indirect nutrients); eagles (habitat, feeding, nesting); bats (winter hibernaculum, summer habitat); deer (important habitat-rich soils); yellow lady's slipper (habitat); people (recreation, some agriculture, mining, development - homes).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)
Composition of Tolerant Mixedwood Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	30%	10%	60% (39 Mat + 21 OF)	21%
Seral Stage	Early	Mid	Late	Unclassified
	33%	29%	16%	22%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	39%	18%	36%	7%

Desired Condition

Late successional mixedwoods of sugar maple, yellow birch, and red spruce in a variety of area sizes and development classes appropriate to the disturbance regimes.

Issues

- very high conversion to other uses at ecodistrict and ecoregional levels
- inadequate representation
- sixty-two percent of the forest is in the early and mid seral stage
- only 16% of the forest is in the late seral stage
- development classes are not balanced for the disturbance regime
- twenty-two percent of the forest is unclassified
- under the Old Forest Policy there are gaps within the representation for sugar maple-yellow birch-beech (3%), sugar maple-yellow birch-red spruce (1%), and red spruce (6%)

Spruce Pine Flats

(Patch) (ICSM, IFSM and WCHO ecosections) (14,512 ha)

A fairly large patch element located throughout the ecodistrict in a variety of area sizes from less than 10 hectares to more than 100 hectares. The inherent climax community of black spruce and white pine is still fairly intact. The majority of the underlying soils are imperfectly drained, fine-textured soils derived from red shales and mudstones. The development classes are fairly well balanced for the frequent stand-initiating disturbance. Thirty-nine percent of the forest is in the mature class.

The EEI is 52 to 58 because of the low (<1%) representation in the reserve class and the fairly high percentage (19%) of land that is unclassified. Approximately 23% of this patch type has been converted in the ecodistrict compared to 31% in the ecoregion.

Flows

Salmon (feeder streams-spawning); wood turtle (feeding, habitat, possible wintering area); eagles (feeding, habitat, possible wintering area); bats (summer habitat); deer (deer wintering area); people (recreation, hunting, farming, exploration-minerals and gas).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)

Composition of Spruce Pine Flats

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	25%	14%	61% (39 Mat + 22 OF)	22%
Seral Stage	Early	Mid	Late	Unclassified
	16%	26%	39%	19%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	67%	6%	24%	3%

Desired Condition

A spruce and white pine-dominated community type with a variety of patch sizes and development classes appropriate to the disturbance regime.

Issues

- nineteen percent of the seral stage is unclassified
- conversion to other uses are 23% in the ecodistrict and 31% in the ecoregion
- approximately 1% of Crown land set aside to represent the black spruce and white pine community under the Old Forest Policy and with 4% of Crown lands identified in the ecodistrict to represent this community type, additional representation is required

Floodplain
(Patch) (IMSM, WCSM and WFSM ecosections) (6,854 ha)

This is a dissected patch element occurring mostly east of the Shubenacadie River and along the Musquodoboit River. Smaller patches occur in Enfield, Upper Rawdon area, Mosherville, Newport Corner, and the Falmouth area.

The area is characterized by two inherent community types that are quite different than the present forest. The black spruce community that occupied approximately 37% of the area is located on the smooth imperfectly drained river flats. In other areas, elm, sugar maple, and ash dominated the flats along the streams and river systems.

This patch type has changed from the mature, late seral hardwood covertype to an early and mid seral softwood-dominated community of red and black spruce, balsam fir, white spruce, and intolerant hardwood mixedwood.

The presence of sugar maple, elm, and ash is now only a component of the Floodplain element. Only 39% of the forest is in the mature development class and 50% is in the early and mid seral category. The EEI is 49 to 57. The lower EEI can be attributed to a fairly high conversion (22%) and no reserve areas identified in the element type.

Flows

Salmon (habitat in some major rivers that run through this patch type - Stewiacke and the Musquodoboit Rivers numerous feeder streams that provide nutrient input); wood turtle (important habitat and feeding areas); eagles (nesting and feeding especially along the Musquodoboit and Stewiacke rivers that run through this patch); bats (summer feeding); deer (good habitat), yellow lady's slipper (habitat); people (fishing, farming, forestry, hunting, recreation, and exploration).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)

Composition of Floodplain

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	27%	16%	57% (39 Mat + 18 OF)	18%
Seral Stage	Early	Mid	Late	Unclassified
	23%	27%	28%	22%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	69%	5%	22%	4%

Desired Condition

Two different community types with the black spruce located on an imperfectly drained fine to medium-textured soils and the sugar maple-elm-ash found on the higher, well-drained areas.

Issues

- low EEI of 49 to 57
- no representation (legal or policy)
- conversion from tolerant hardwood covertype to softwood and intolerant hardwood mixedwood
- fifty percent of the forest in an early and mid seral stage
- twenty-two percent of the seral stage is unclassified
- unbalanced development classes in relation to the disturbance regimes (gap-frequent stand-initiating)
- no representation in either legal or policy reserves within this element type. All three ecosections and their climax community type do have representation within other element types throughout the ecoregion. Under the Old Growth Policy the Crown has set aside 10% and 7% of the lands under their administration and control to represent the elm-sugar maple-ash and the black spruce communities.

Wetlands

(Patch) (WTLD ecosection) (4,552 ha)

These wetlands occur in three fairly large areas: Stanley (Anthony Lake, Tomcod River, Shields Lake, and The Barrens), Musquodoboit River (from Meaghers Grant to Gibraltar Rock), and Stewiacke River (Otter Brook and South Branch Stewiacke River).

Smaller areas are located in the central and eastern sections of the ecodistrict. These wetland areas are important in water collection, filtering, and groundwater recharge.

Most of these wetland areas can be characterized by the presence of stunted black spruce and larch, poor drainage, high grasses, and/or ericaceous vegetation.

Flows

Salmon (filtering, water quality, provides water); bats (summer feeding); deer (general habitat, bogs in winter); people (peat, recreation, trapping, hunting, fishing).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)

Composition of Wetlands

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	14%	24%	62% (43 Mat + 19 OF)	19%
Seral Stage	Early	Mid	Late	Unclassified
	14%	24%	53%	9%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	77%	4%	18%	1%

Desired Condition

Wetlands and/or wetland complexes that are connected to the local hydrological system.

Issues

- low percentage of wetlands identified for representation
- trends to develop in and around these wetlands.
- public education on the use and importance of these wetlands
- only 2% of the wetlands have been identified for representation under the Old Forest Policy
- no representation under the legal reserves for these wetlands

Marshes and Grasslands

(Patch) (DKLD ecosection) (2,472 ha)

This patch type is a mixture of lowlands, disturbed forest habitats, farmlands, some dykelands, tidal marshes, and fertile river valleys.

In the 17th century, the Acadians settled in the Windsor area, including the St. Croix River and the Kennetcook River. Their dyking of these lands significantly altered the coastal and estuarine landscape.

About 1760, New England Planters settled on these dykelands and employed the remaining Acadians to maintain them. It was the Loyalists, Germans, and Yorkshire settlers who later came and farmed these fertile soils. These areas remain today as some of the most productive farming areas in Nova Scotia.

The marshes and grassland also occur around the Shubenacadie River from Admiral Rock to Gays River, including the Stewiacke River up to the Murray Siding area.

These areas are used by thousands of migrating shore birds, ducks, and geese. These marshes and grasslands are also associated with fertile riparian zones which support some rare intervale plants.

Flows

Salmon (nutrient - input, food sources); shore birds (indirect - geese feeding); eagles (hunting area); bats (summer feeding); deer (general habitat); people (agriculture, recreation, hunting, trapping, fishing).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)
Composition of Marshes and Grasslands

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	17%	6%	77% (44 Mat + 33 OF)	33%
Seral Stage	Early	Mid	Late	Unclassified
	37%	42%	11%	10%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	19%	35%	42%	4%

Desired Condition

A series of undisturbed freshwater and saltwater marshes and grasslands with inclusions of lakes, rivers, bogs, and peat lands.

Issues

- protection of these areas from development
- continued maintenance of these dykelands
- lack of representation at the local level

Salt Marsh

(Patch) (XXMS ecosection) (1,025 ha)

The twice daily tidal actions of the Bay of Fundy created extensive areas of salt marsh along the floodplains of the Stewaicke, Shubenacadie, Kennetcook, Herbert, Cheverie, Tennycape, Cogmagun, St. Croix, Avon, and Walton rivers and their tributaries.

These salt marshes also occurred along the tidal flats of the Minas Basin. Deposits of silty clay loam sediments, with semi-decomposed grasses and sedges trapped in the accumulating layers, formed along the tidal shores and in estuaries found at the mouths of rivers and streams subjected

to tidal conditions. Reclamation for agriculture use has resulted in most of these marshes being drained and protected from daily salt water flooding.

Currently there are only a few small salt marshes remaining along the Stewiacke and Shubenacadie rivers. The remaining salt marshes are concentrated on the river estuaries along the Minas Basin and along the Cogmagun, Kennetcook, and St. Croix rivers.

The dominant natural vegetation of salt marshes is cordgrass species. Where tidal exchange has been impeded, freshwater plants such as cattails will become more noticeable.

Flows

Salmon (food, filter); shorebirds (habitat, feeding); eagles (hunting); bats (summer feeding); deer (general habitat, food - kelp); people (recreation).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)
Composition of Salt Marsh

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	7%	4%	89% (62 Mat +27 OF)	27%
Seral Stage	Early	Mid	Late	Unclassified
	67%	21%	7%	5%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	21%	37%	40%	2%

Desired Condition

The salt marshes are dominated by grasses and are in intertidal zones where there is moderate to low wave action and are protected by the highest waves and storms. It is important to maintain these locations since salt marshes provide nutrients and habitat for various fish species, feature high species diversity, and provide significant ecological functions and services.

Tolerant Hardwood Drumlins and Hummocks
(Patch) (IFDM and WFDM ecosections) (335 ha)

Tolerant Hardwood Drumlins and Hummocks is a small patch element located in two general areas: the Musquodoboit Valley near Middle Musquodoboit and the Elderbank area. The inherent climax community was sugar maple-yellow birch-beech with a gap disturbance.

The present forest composition is 77% softwood with black and red spruce comprising 39% of the element. Balsam fir and white spruce make up an additional 19%. Intolerant hardwood as part of mixedwood accounts for 21% of the forested lands. Tolerant hardwoods of sugar maple, yellow birch, and beech account for less than 1% of the element.

Only 16% of the forest land is in the late seral stage, which is predominately red and black spruce. Forty-six percent of the forest is in the establishment development class while only 13% is in the mature category.

The EEI is 42 to 60 because there is no representation in reserve area and part of the forest has been converted to other uses.

Flows

Wood turtle (feeding); eagles (nesting sites); bats (summer habitat); deer (feeding and shelter); people (recreation, development of homes, exploration - minerals, gas).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)

Composition of Tolerant Hardwood Drumlins and Hummocks

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	46%	39%	15% (13 Mat + 2 OF)	2%
Seral Stage	Early	Mid	Late	Unclassified
	19%	21%	16%	44%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	77%	0%	21%	2%

Desired Condition

Late seral hardwoods of sugar maple and yellow birch with at least 70% of the forest in the mature development class.

Issues

- patch type has been converted from a tolerant hardwood covertype to predominately softwood (Appendix 10)
- only 16% of the forest is in the late seral stage
- forty-six per cent of area is in the establishment development class and only 13% in the mature class
- WFSM ecosection has 57% conversion at ecodistrict level and 68% conversion at ecoregion level (Appendix 3 Table 2)
- less than 3% of area of ecodistrict has representation in the sugar maple-yellow birch-beech community and there is no representation of community type within this element

Valley Corridors

(Corridor) (Various ecosections) (21,698 ha)

This is a linear element consisting of a series of major river corridors that dissect the ecodistrict in several locations (Map 2). The main corridors include the Kennetcook, St. Croix, Shubenacadie, Stewiacke, St. Andrews, and the Musquodoboit rivers.

The inherent climax community is black spruce and white pine, black spruce, elm-sugar maple-ash. The current forest is spruce-dominated but there is more mixedwood with intolerant hardwoods of red maple, white birch, aspen, and grey birch.

Fifty-nine percent of the forest is in the early and mid seral stage. Only 28% of the forest is in the late seral category.

The development classes are fairly well balanced for the disturbance regime.

The EEI is only 40 to 43, mainly as a result of the large areas that have been converted around Falmouth, St. Croix, Stewiacke Valley, and along the major rivers and coastline.

Flows

Salmon (movement, spawning - Kennetcook, Nine Mile, Stewiacke, Shubenacadie rivers, movement and habitat on St. Croix, Walton, and Herbert rivers); wood turtle (habitat and feeding - Kennetcook, Nine Mile, Stewiacke, Shubenacadie, Walton, and Herbert rivers); shorebirds (feeding and nesting in the lower reaches of the Kennetcook, Nine Mile, Stewiacke, Shubie, Walton, and Cogmagun rivers); eagles (habitat, nesting, and feeding on most of the river systems, winter habitat on the Stewiacke and Shubenacadie rivers); bats (summer habitat on all the corridor systems, winter hibernaculum on the St. Croix/Hayes Cave area); deer (habitat in all areas, wintering area on the Stewiacke and Shubenacadie rivers); yellow lady's slipper (rare riparian plants found on most systems except the Walton River); people (recreation, fishing, hunting exploration - hydro on the St. Croix River, tidal rafting on the Shubenacadie River, agriculture, travel highway).

Composition

Central Lowlands Ecodistrict 630 (based on statistics up to 2006)

Composition of Valley Corridors

Development Class	Establishment	Young Competing	Mature (incl. multi-aged and old forest)	Multi-aged and Old Forest
	21%	20%	59% (39 Mat + 20 OF)	20%
Seral Stage	Early	Mid	Late	Unclassified
	24%	35%	28%	13%
Covertype	Softwood	Hardwood	Mixedwood	Unclassified
	67%	7%	22%	4%

Desired Condition

A series of corridor systems of slopes and intervales that remain connected and are in a natural forest condition.

Issues

- low EEI
- high conversion rates (39%)
- ≤ 1% of the area in legal or policy reserves
- only 28% of the forest in the late seral stage
- most of the gaps in this element are recognized in the matrix and various patch elements

Ecosystem Issues and Opportunities (All appendices and maps)

Management of the forest resource in the Central Lowlands Ecodistrict should focus on forest biodiversity conservation across the range of spatial scales. General principles could include maintenance of connectivity, maintenance of landscape heterogeneity, maintenance of stand structural complexity, and maintenance of the integrity of aquatic systems (Lindenmayer and Franklin 2002). Actions taken toward these principles could consider:

- Central Lowlands is located in a relatively rural area that is heavily forested but it has a fairly high intensity of land use as indicated by the ecological emphasis index of 50 to 60.
- Over 30% of the forest within the two largest elements (Red and Black Spruce Hummocks and Tolerant Mixedwood Hills) is in the establishment development class.
- The ecodistrict has a low percentage of the forest in the mature and multi-aged development classes in elements that have gap and infrequent stand-initiating disturbances.
- A high percentage of the ecodistrict is unclassified.
- The once dominant hardwood covertype in the Floodplain element is now 69% softwood.
- Early and mid seral species dominate most element types.
- Representation is only 1% of the total ecodistrict.
- Crown ownership is 16%.
- Some additional old growth area is required in some of the climax community types.
- There is no representation within the Central Lowlands under legal reserves. A number of small areas are being proposed for representation under the Colin Stewart Forest Forum.

Appendix 1: Flow - Element Interactions

Element	Salmon	Wood Turtle	Shorebirds	Eagles	Bats	Deer	Yellow Lady's Slipper	People
Matrix Red and Black Spruce Hummocks	Spawning, habitat, water catchment	feeding habitat	----------	----------	Summer habitat - feeding, resting	Habitat	----------	Hunting, fishing, exploration, petroleum, harvesting
Valley Corridors Kennetcook and Nine Mile rivers	Movement, spawning, upper reaches (shad, smelts)	Habitat - feeding, shelter	lower reaches -feeding, resting	habitat - nesting, feeding	Summer feeding Hayes Cave included	habitat	Rare riparian zone plants	recreation, fishing, hunting trapping travel - highway
Stewiacke/ Shubenacadie rivers	Movement, spawning, habitat, other fish species - stripped bass	Habitat - feeding, shelter	Lower reaches in the Maitland area	Habitat - nesting, feeding, winter habitat	summer feeding	Habitat - Deer Wintering Area (DWA)	Rare riparian plants	Travel corridor, exploration, tidal rafting, recreation, fishing
St. Croix River	Feeder stream habitat only due to hydro dam	----------	----------	Habitat, nesting	Winter hibernaculum summer feeding	Habitat	Rare riparian plants	Hydro development, recreation - boating, fishing
Walton River	Movement, habitat, gaspereau	Habitat	Feeding	Habitat, nesting	summer feeding	good habitat	----------	Recreation, exploration
Meander River	Habitat, migratory fish	_____	_____	Habitat - feeding and perching areas	summer feeding	good habitat	important for rare plants	Agriculture, recreation
Cogmagun River	Sea trout run - fall	_____	bottom reaches - habitat	habitat - nesting	summer feeding, use	good habitat - good soils	intervale plants	Agriculture, recreation
Herbert River	habitat, movement	Habitat	_____	Nesting, hunting	summer feeding	general habitat	some rare riparian plants	recreation, some agriculture

Appendix 1: Flow - Element Interactions

Element	Salmon	Wood Turtle	Shorebirds	Eagles	Bats	Deer	Yellow Lady's Slipper	People
Patches Tolerant Mixedwood Hummocks	Catchment, filter, nutrients	important feeding habitat zone 1	indirect nutrients	habitat - feeding, nesting	winter hibernaculum summer habitat	important habitat - rich soils	Habitat	recreation, some agriculture, mining, development - homes
Tolerant Hardwood Drumlins and Hummocks	_____	Feeding	_____	Nesting sites	Summer habitat	Feeding and shelter	_____	recreation development of homes, exploration - minerals, gas
Spruce Pine Flats	feeder streams - spawning	Feeding habitat possible wintering habitat	_____	General	Summer habitat	DWA	_____	Recreation, hunting, farming, exploration - minerals, gas
Tolerant Mixedwood Hills	Some minor movement in the Gays, West St. Andrews, Shubenacadie - mostly striped bass, gaspereau, shad	feeding habitat	----------	nesting, feeding - mostly around the Shubenacadie River system	Summer habitat - feeding, resting	Habitat	----------	Agriculture, hunting, fishing, exploration, harvesting
Wetlands	Filtering, water quality, provides water	_____	_____	_____	Summer feeding	General habitat, Bogs - winter	_____	Peat, recreation - trapping, hunting, fishing
Marshes and Grasslands	Nutrient - input, food source	_____	indirect - geese feeding	hunting area	Summer feeding	general habitat	_____	agriculture, recreation - hunting, trapping, fishing

Appendix 1: Flow - Element Interactions

Element	Salmon	Wood Turtle	Shorebirds	Eagles	Bats	Deer	Yellow Lady's Slipper	People
Floodplain	habitat in some major river systems - Stewiacke, Musquodoboit Patch type has numerous feeder streams, nutrient input	feeding habitat		nesting, and feeding especially along the Musquodoboit and Stewiacke rivers that run through this element	Summer feeding	very good general habitat	habitat	fishing, farming forestry, hunting, recreation, exploration
Salt Marsh	food, filter		habitat - feeding	hunting	summer feeding	general habitat - food kelp		recreation

Appendix 2a: Landscape Connectivity Worksheet

Feature	Structure Type (corridor, matrix, patch, island)	Importance in Ecodistrict (high, moderate, low)	Significant Cases (species, ecosections, specific rivers)	Scale and Pattern of Operation (local, landscape)	Associated Natural Disturbance Regime	Characteristic Community	Characteristic Neighbour(s)	Barriers - Impediments to Functionality	Significant Issues	Management Strategy
Red and Black Spruce Hummocks	Matrix	Very High	Cogmagun River, Nine Mile River, Five Mile River, Shubenacadie (Shad, smelts, bass, old forest, bat caves)	Very large matrix extending over the entire ecodistrict - variety of old forest patches predominately in the Stanley area.	Frequent and Infrequent	Dominated by mid and late seral softwood of red spruce, black spruce and balsam fir - early and mid-intolerant hardwoods of red maple, grey birch, and white birch comprise approximately 15 to 20 percent	- rS eH bS and scattered rP and wP	river corridors, transportation routes, increased harvesting - conversion to agriculture (blueberry)	the amount of forest in the early and mid seral stage (50%) - 37% of the forest in early development stage - conversion to agriculture - fragmentation	Manage to increase more mid and late seral - move to more mature development class - maintain the non-converted - increase Crown ownership
Tolerant Mixedwood Hills	Patch	High	Shubenacadie, Kennetcook, Five Mile, Stewiacke rivers Old forest – St. Andrews River, Meadow, and Elderbank Main transportation route (102) through the ecodistrict	Large element type that is continuous and concentrated in the western part of the ecodistrict. Smaller patches found in the outer perimeter of the ecodistrict	Infrequent and Gap	Early and mid-seral softwood that is concentrated in the establishment and young development classes. Red and black spruce are dominant but fairly high component of intolerant hardwoods in mixedwood stands	red spruce, black spruce, and balsam fir - early and mid-intolerant hardwoods of red maple, grey birch, and white birch	transportation routes - interesting roads strong agricultural areas	early and mid seral stage accounts for 63% of the forest. - only 39% of the forest in the mature development class. - conversion to other uses (20%) - increased harvesting	maintain the few areas that have low road densities - increase forest area in mature class and late seral stages - increase Crown holdings.

Appendix 2a: Landscape Connectivity Worksheet

Feature	Structure Type (corridor, matrix, patch, island)	Importance in Ecodistrict (high, moderate, low)	Significant Cases (species, ecosections, specific rivers)	Scale and Pattern of Operation (local, landscape)	Associated Natural Disturbance Regime	Characteristic Community	Characteristic Neighbour(s)	Barriers - Impediments to Functionality	Significant Issues	Management Strategy
Tolerant Mixedwood Hummocks	Patch	High	Kennetcook River, St. Croix, Herbert	fairly uniform patch type that occurs in medium to fairly large patches	Frequent / Infrequent / Gap	Present community of Black spruce, red spruce, sugar maple - Yellow birch - balsam fir and intolerant hardwoods	Dominated by mid and late seral softwood of red spruce, black spruce, and balsam fir - early and mid-intolerant hardwoods of red maple, grey birch, and white birch	-very high conversion (29%) - fragmentation - harvesting -transportation corridors	- high proportion of forest in early and mid seral - conversion	- move seral stage to more mid and late stages through silviculture - improve / increase percentage of mature forest - maintain the few low road density areas
Valley Corridors	Corridor	High	- Meander - Kennetcook - Musquodoboit - St. Croix, Herbert, Shubie, Stewiacke, Walton, Cogmagun	Some very important and major rivers that dissect this ecodistrict; Musquodoboit, Shubie, Stewiacke, Kennetcook	All	Black Spruce - Red Spruce, - Black Spruce, - Sugar Maple - Yellow Birch-Red Spruce, Elm - Sugar Maple-Ash	All	Fragmentation - conversion to other uses - human settlements, agriculture, transportation routes	conversion - 59% of the forest in early and mid seral stage	restore forest communities along these systems - manage for long-lived climax communities through silviculture

Appendix 2a: Landscape Connectivity Worksheet

Feature	Structure Type (corridor, matrix, patch, island)	Importance in Ecodistrict (high, moderate, low)	Significant Cases (species, ecosections, specific rivers)	Scale and Pattern of Operation (local, landscape)	Associated Natural Disturbance Regime	Characteristic Community	Characteristic Neighbour(s)	Barriers - Impediments to Functionality	Significant Issues	Management Strategy
Spruce Pine Flats	Patch	Moderate to High	IFSM (ecosection) dominant	Fairly uniform distribution over the entire ecodistrict	Frequent	Black spruce - White pine - Red spruce - Hemlock - White pine	Dominated by mid and late seral softwood of red spruce, black spruce, and balsam fir - early and mid-intolerant hardwoods of red maple, grey birch, and white birch	Conversion - connectivity - road systems	Conversion	Manage to frequent NDR - short to medium rotation with representation in all seral stages - improve representation - these areas occur along the streams - the smooth areas that are so important in the connective function to the hydrological system
Tolerant Hardwood Drumlins and Hummocks	Patch	Low	IFDM and WFDM - Musquodoboit Valley and Elderbank area	small isolated areas	Gap	Sugar Maple - Yellow Birch - Beech	Black spruce -Elm - sugar maple- white ash	small disjunctive areas - converted from hardwood to predominately softwood	Very young forests in the establishment class. - converted from hardwood to softwood - only 13% in the mature category	manage to the gap disturbance - silviculture investment will be required to shift the forest back to a late seral mature climax community

Appendix 2a: Landscape Connectivity Worksheet

Feature	Structure Type (corridor, matrix, patch, island)	Importance in Ecodistrict (high, moderate, low)	Significant Cases (species, ecosections, specific rivers)	Scale and Pattern of Operation (local, landscape)	Associated Natural Disturbance Regime	Characteristic Community	Characteristic Neighbour(s)	Barriers - Impediments to Functionality	Significant Issues	Management Strategy
Wetlands	Patch	High	WTLD - South Branch Meadow - Porcupine Meadow - Petite Bog - Colin Bog - MacDonald Bog	larger wetlands are isolated to two to three locations. - smaller wetlands scattered over southern section of the ecodistrict	----------	Black Spruce	Dominated by mid and late seral softwood of red spruce, black spruce, and balsam fir - early and mid-intolerant hardwoods of red maple, grey birch	Connectivity	insufficient representation - trends to develop	- public education reduce development - set aside additional areas aside for representation
Floodplain	Patch	Low to Medium	IMSM dominant	Small to medium fragmented and isolated patches occurring in the central and eastern areas of the ecodistrict	Frequent and gap	Black spruce - Elm - sugar maple - white ash	Early and mid-seral softwood that is concentrated in the establishment and young development classes. Red and black spruce are dominant but fairly high component of intolerant hardwoods in mixedwood stands	Connectivity - conversion - lack of mature late seral structure	ownership (Crown 3%) - restoration opportunities are limited	education to private woodland owners - restoration where possible - increase climax species in the key areas

Appendix 2a: Landscape Connectivity Worksheet

Feature	Structure Type (corridor, matrix, patch, island)	Importance in Ecodistrict (high, moderate, low)	Significant Cases (species, ecosections, specific rivers)	Scale and Pattern of Operation (local, landscape)	Associated Natural Disturbance Regime	Characteristic Community	Characteristic Neighbour(s)	Barriers - Impediments to Functionality	Significant Issues	Management Strategy
Marshes and Grasslands	Patch	Medium	DKLD	Shubenacadie River system - Gays River, mouth of the Kennetcook River and Martock area	_____ _____	Dyked grasslands	Early and mid-seral softwood that is concentrated in the establishment and young development classes. Red and black spruce are dominant but fairly high component of intolerant hardwoods in mixedwood stands	lack of maintenance	- development - cost to maintain - ownership - lack of representation	rich ecosystems in these areas have now changed to an agricultural system - important to maintain. - improve representation when opportunities become available
Salt Marsh	Patch	Medium to high	Mouth of the Cogmagun, St. Croix, Kennetcook, and Walton rivers	Small areas centred in the western part of the ecodistrict	----------	xxms – salt marshes that are dominated by grasses	Valley Corridors	changes in water courses, development, Agriculture	- development	Maintain - very important for the habitat that they provide along with the high species diversity

Appendix 2b: Connective Management Strategies

Structure Type	Attributes	Conditions of Concern	Management Strategies
Matrix	percolation, large patch, interior habitat	fragmentation, excessive edge	1. Promote contiguous forest structure using strategies such as patch aggregation and overstory-sustaining selection cutting 2. Promote large patch structure and interior conditions 3. Mitigate large scale, long term, fragmentation of the matrix that could impede percolation 4. Manage age and structure appropriate to NDR. For gap and infrequently disturbed ecosections maintain 60% mature cover
Patch Ecosystems	patch size, nearest neighbour, edge / interior, intervening habitat condition	undesirable connections, internal composition, excessive separations, threats to key patch	1. Identify and map key patch representatives (high quality, or critical link/distance) 2. Maintain natural isolations, as well as necessary "nearest neighbour" distances 3. Identify potential metapopulation habitat dynamics (if applicable)
Linear Corridors	continuous connection	barriers, interruptions, excessive edge	1. Mitigate unnatural barriers 2. Map and Manage along natural boundaries 3. Conserve "interior" conditions where appropriate through strategic management of neighbouring ecosystems 4. Sustain continuity, through management of overstory and interior structure appropriate to NDR 5. Follow habitat regulations for buffer management. Establish wider buffers with natural boundaries along major waterways

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1a: Species at Risk (species protected by endangered species legislation on all lands)

SPECIES		DESIGNATION		
Common Name	**Scientific Name**	**Provincial**	**Federal**	**COSEWIC**
BIRDS				
Red Knot rufa ssp	*Calidris canutus rufa*	Endangered	N/A	Endangered
Chimney Swift	*Chaetura pelagica*	Endangered	Threatened	Threatened
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened
Eastern Wood-Pewee	*Contopus virens*	Vulnerable	N/A	Special Concern
Bobolink	*Dolichonyx oryzivorus*	Vulnerable	N/A	Threatened
Rusty Blackbird	*Euphagus carolinus*	Endangered	Special Concern	Special Concern
Peregrine Falcon - anatum/tundrius	*Falco peregrinus pop. 1*	N/A	Special Concern	Special Concern
Barn Swallow	*Hirundo rustica*	Endangered	N/A	Threatened
Bank Swallow	*Riparia riparia*	N/A	N/A	Threatened
Canada Warbler	*Wilsonia canadensis*	Endangered	Threatened	Threatened
BRYOPHYTES				
Pygmy Pocket Moss	*Fissidens exilis*	N/A	N/A	Special Concern
DICOTS				
Black Ash	*Fraxinus nigra*	Threatened	N/A	N/A
FISH				
Atlantic Sturgeon	*Acipenser oxyrinchus*	N/A	N/A	Threatened
American Eel	*Anguilla rostrata*	N/A	N/A	Threatened
Striped Bass- Bay of Fundy pop.	*Morone saxatilis pop. 2*	N/A	N/A	Endangered
Atlantic Salmon - Inner Bay of Fundy population	*Salmo salar pop. 1*	N/A	Endangered	Endangered
GYMNOSPERMS				
Eastern White Cedar	*Thuja occidentalis*	Vulnerable	N/A	N/A
INSECTS				
Monarch	*Danaus plexippus*	N/A	Special Concern	Special Concern
Skillet Clubtail	*Gomphus ventricosus*	N/A	Endangered	Endangered
MAMMALS				
Little Brown Myotis	*Myotis lucifugus*	Endangered	N/A	Endangered
Northern Long-eared Myotis	*Myotis septentrionalis*	Endangered	N/A	Endangered
Eastern Pipistrelle	*Perimyotis subflavus*	Endangered	N/A	Endangered

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1a: Species at Risk (species protected by endangered species legislation on all lands)

SPECIES		DESIGNATION		
Common Name	**Scientific Name**	**Provincial**	**Federal**	**COSEWIC**
MOLLUSKS				
Brook Floater	*Alasmidonta varicosa*	Threatened	N/A	Special Concern
MONOCOTS				
Ram's-Head Lady's-Slipper	*Cypripedium arietinum*	Endangered	N/A	N/A
REPTILES				
Wood Turtle	*Glyptemys insculpta*	Threatened	Threatened	Threatened

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
AMPHIBIANS			
Four-toed Salamander	*Hemidactylium scutatum*	Secure (Green)	S3
BIRDS	-		
Spotted Sandpiper Least	*Actitis macularius*	Sensitive (Yellow)	S3S4B
Sandpiper Semipalmated	*Calidris minutilla*	Secure (Green)	S1B,S5M
Sandpiper Pine Siskin	*Calidris pusilla*	Sensitive (Yellow)	S3M
Semipalmated Plover	*Carduelis pinus*	Sensitive (Yellow)	S3S4B,S5N
Killdeer	*Charadrius semipalmatus*	Secure (Green)	S1S2B,S5M
Bay-breasted Warbler	*Charadrius vociferus*	Sensitive (Yellow)	S3S4B
Gray Catbird	*Dendroica castanea*	Sensitive (Yellow)	S3S4B
Yellow-bellied Flycatcher	*Dumetella carolinensis*	May Be At Risk (Orange)	S3B
Wilson's Snipe	*Empidonax flaviventris*	Sensitive (Yellow)	S3S4B
Common Loon	*Gallinago delicata*	Sensitive (Yellow)	S3S4B
Hudsonian Godwit	*Gavia immer*	May Be At Risk (Orange)	S3B,S4N
Northern Mockingbird	*Limosa haemastica*	Sensitive (Yellow)	S3M
Cliff Swallow	*Mimus polyglottos*	Secure (Green)	S3B
Black-backed Woodpecker	*Petrochelidon pyrrhonota*	May Be At Risk (Orange)	S3B
American Golden-Plover	*Picoides arcticus*	Sensitive (Yellow)	S3S4
Boreal Chickadee	*Pluvialis dominica*	Sensitive (Yellow)	S3M
Eastern Phoebe	*Poecile hudsonica*	Sensitive (Yellow)	S3
Eastern Bluebird	*Sayornis phoebe*	Sensitive (Yellow)	S3S4B
Greater Yellowlegs	*Sialia sialis*	Sensitive (Yellow)	S3B
Willet	*Tringa melanoleuca*	Sensitive (Yellow)	S3B,S5M
Solitary Sandpiper	*Tringa semipalmata*	May Be At Risk (Orange)	S2S3B
	Tringa solitaria	Secure (Green)	S1?B,S4S5M
BRYOPHYTES			
Aloe-Like Rigid Screw Moss	*Aloina rigida*	May Be At Risk (Orange)	S1
Light Beaked Moss	*Eurhynchium hians*	Sensitive (Yellow)	S2?
Anomalous Bristle Moss	*Orthotrichum anomalum*	Sensitive (Yellow)	S2S3
Tufted Fen Moss	*Paludella squarrosa*	Sensitive (Yellow)	S2?
Wulf's Peat Moss	*Sphagnum wulfianum*	Sensitive (Yellow)	S2S3
DICOTS			
Hooked Agrimony	*Agrimonia gryposepala*	Secure (Green)	S3

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
Running Serviceberry	*Amelanchier stolonifera*	Secure (Green)	S3?
Wood Anemone	*Anemone quinquefolia*	Sensitive (Yellow)	S2
Virginia Anemone	*Anemone virginiana*	May Be At Risk (Orange)	S2
Purple-stemmed Angelica	*Angelica atropurpurea*	Secure (Green)	S3S4
a Pussytoes	*Antennaria parlinii*	May Be At Risk (Orange)	S1
Swamp Milkweed	*Asclepias incarnata*	Secure (Green)	S3
Swamp Milkweed	*Asclepias incarnata ssp. pulchra*	Undetermined (Undetermined)	S2S3
Marsh Bellflower	*Campanula aparinoides*	Sensitive (Yellow)	S3
Blue Cohosh	*Caulophyllum thalictroides*	May Be At Risk (Orange)	S2
Prickly Hornwort	*Ceratophyllum echinatum*	May Be At Risk (Orange)	S2?
Chinese Hemlock-parsley	*Conioselinum chinense*	Sensitive (Yellow)	S2
Quebec Hawthorn	*Crataegus submollis*	Undetermined	S1?
Wild Comfrey	*Cynoglossum virginianum var. boreale*	May Be At Risk (Orange)	S1
Large Tick-Trefoil	*Desmodium glutinosum*	May Be At Risk (Orange)	S1
Eastern Leatherwood	*Dirca palustris*	May Be At Risk (Orange)	S1
Downy Willowherb	*Epilobium strictum*	Sensitive (Yellow)	S3
Hyssop-leaved Fleabane	*Erigeron hyssopifolius*	Sensitive (Yellow)	S3
Philadelphia Fleabane	*Erigeron philadelphicus*	Sensitive (Yellow)	S2
Labrador Bedstraw	*Galium labradoricum*	Sensitive (Yellow)	S2
Bicknell's Crane's-bill	*Geranium bicknellii*	Secure (Green)	S3
Clammy Hedge-Hyssop	*Gratiola neglecta*	Sensitive (Yellow)	S1S2
Round-lobed Hepatica	*Hepatica nobilis var. obtusa*	May Be At Risk (Orange)	S1S2
Big-leaved Marsh-elder	*Iva frutescens ssp. oraria*	Sensitive (Yellow)	S2
Canada Wood Nettle	*Laportea canadensis*	Sensitive (Yellow)	S3
Yellow-seeded False Pimperel	*Lindernia dubia*	Secure (Green)	S3S4
Water Beggarticks	*Megalodonta beckii*	Sensitive (Yellow)	S3
Farwell's Water Milfoil	*Myriophyllum farwellii*	Sensitive (Yellow)	S2
Siberian Water Milfoil	*Myriophyllum sibiricum*	Secure (Green)	S3S4
Whorled Water Milfoil	*Myriophyllum verticillatum*	Sensitive (Yellow)	S2
Smooth Sweet Cicely	*Osmorhiza longistylis*	May Be At Risk (Orange)	S2
Balsam Groundsel	*Packera paupercula*	Secure (Green)	S3
Dwarf Clearweed	*Pilea pumila*	May Be At Risk (Orange)	S1
Rugel's Plantain	*Plantago rugelii*	Undetermined	S2
Small's Knotweed	*Polygonum buxiforme*	Undetermined	S2S3
Carey's Smartweed	*Polygonum careyi*	Undetermined	S1

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
Pennsylvania Smartweed	*Polygonum pensylvanicum*	Secure (Green)	S3
Stout Smartweed	*Polygonum robustius*	Secure (Green)	S3S4
Climbing False Buckwheat	*Polygonum scandens*	Sensitive (Yellow)	S3
Mistassini Primrose	*Primula mistassinica*	Sensitive (Yellow)	S2
Intermediate Mermaidweed	*Proserpinaca intermedia*	May Be At Risk (Orange)	S1
Marsh Mermaidweed	*Proserpinaca palustris*	Secure (Green)	S3
Marsh Mermaidweed	*Proserpinaca palustris var. crebra*	Secure (Green)	S3
Pink Pyrola	*Pyrola asarifolia*	Secure (Green)	S3
Gmelin's Water Buttercup	*Ranunculus gmelinii*	Secure (Green)	S3
Alder-leaved Buckthorn	*Rhamnus alnifolia*	Sensitive (Yellow)	S3
Wild Black Currant	*Ribes americanum*	Undetermined	S1
Swamp Rose	*Rosa palustris*	Secure (Green)	S3
Cut-Leaved Coneflower	*Rudbeckia laciniata*	Sensitive (Yellow)	S2
Triangular-valve Dock	*Rumex salicifolius var. mexicanus*	Sensitive (Yellow)	S2
Bog Willow	*Salix pedicellaris*	Sensitive (Yellow)	S2
Meadow Willow	*Salix petiolaris*	Secure (Green)	S3
Silky Willow	*Salix sericea*	May Be At Risk (Orange)	S2
Bloodroot	*Sanguinaria canadensis*	Secure (Green)	S3S4
Clustered Sanicle	*Sanicula odorata*	May Be At Risk (Orange)	S1
Soapberry	*Shepherdia canadensis*	Sensitive (Yellow)	S2
Long-leaved Starwort	*Stellaria longifolia*	Sensitive (Yellow)	S3
Horned Sea-blite	*Suaeda calceoliformis*	Secure (Green)	S2S3
Roland's Sea-Blite	*Suaeda rolandii*	May Be At Risk (Orange)	S1?
Fringed Blue Aster	*Symphyotrichum ciliolatum*	Sensitive (Yellow)	S2S3
Wavy-leaved Aster	*Symphyotrichum undulatum*	Sensitive (Yellow)	S2
Heart-leaved Foamflower	*Tiarella cordifolia*	Sensitive (Yellow)	S2
Orange-fruited Tinker's Weed	*Triosteum aurantiacum*	Sensitive (Yellow)	S2
Humped Bladderwort	*Utricularia gibba*	Secure (Green)	S3S4
Blue Vervain Canada	*Verbena hastata*	Secure (Green)	S3
Violet Northern Bog	*Viola canadensis*	Extirpated	S1
Violet Arrow-Leaved	*Viola nephrophylla*	Sensitive (Yellow)	S2
Violet Golden	*Viola sagittata var. ovata*	Secure (Green)	S3S4
Alexanders	*Zizia aurea*	May Be At Risk (Orange)	S1

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
FERNS AND THEIR ALLIES			
Northern Maidenhair Fern	*Adiantum pedatum*	May Be At Risk (Orange)	S1
Least Moonwort	*Botrychium simplex*	Sensitive (Yellow)	S2S3
Steller's Rockbrake	*Cryptogramma stelleri*	May Be At Risk (Orange)	S1
Bulblet Bladder Fern	*Cystopteris bulbifera*	Secure (Green)	S3S4
Common Scouring-rush	*Equisetum hyemale var. affine*	Secure (Green)	S3S4
Meadow Horsetail	*Equisetum pratense*	Sensitive (Yellow)	S2
Dwarf Scouring-Rush	*Equisetum scirpoides*	Secure (Green)	S3S4
Variegated Horsetail	*Equisetum variegatum*	Secure (Green)	S3
Acadian Quillwort	*Isoetes acadiensis*	Sensitive (Yellow)	S3
Appalachian Polypody	*Polypodium appalachianum*	Undetermined	S3?
Rock Spikemoss	*Selaginella rupestris*	May Be At Risk (Orange)	S1
FISH			
Atlantic Salmon	*Salmo salar*	May Be At Risk (Orange)	S2
INSECTS			
Ocellated Darner	*Boyeria grafiana*	Sensitive (Yellow)	S3
Henry's Elfin	*Callophrys henrici*	Secure (Green)	S2
Bog Elfin	*Callophrys lanoraieensis*	May Be At Risk (Orange)	S1S2
Hoary Elfin Prince	*Callophrys polios*	Secure (Green)	S3S4
Baskettail Baltimore	*Epitheca princeps*	Sensitive (Yellow)	S2
Checkerspot Harvester	*Euphydryas phaeton*	Secure (Green)	S3
Northern Pearly-Eye	*Feniseca tarquinius*	Secure (Green)	S3S4
Bronze Copper	*Lethe anthedon*	Secure (Green)	S3
Elfin Skimmer	*Lycaena hyllus*	Secure (Green)	S1
Compton Tortoiseshell	*Nannothemis bella*	Secure (Green)	S3
Jutta Arctic	*Nymphalis l-album*	Secure (Green)	S1S2
Brook Snaketail	*Oeneis jutta*	May Be At Risk (Orange)	S1
Riffle Snaketail	*Ophiogomphus aspersus*	May Be At Risk (Orange)	S1
Rusty Snaketail	*Ophiogomphus carolus*	Secure (Green)	S3
Mustard White	*Ophiogomphus rupinsulensis*	May Be At Risk (Orange)	S1S2
Eastern Comma	*Pieris oleracea Polygonia*	Sensitive (Yellow)	S2
Question Mark	*comma Polygonia*	At Risk (Red)	S2
Grey Comma	*interrogationis Polygonia*	Secure (Green)	S3B
	progne	Secure (Green)	S3S4

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
Striped Hairstreak	*Satyrium liparops*	Undetermined	S3
Clamp-Tipped Emerald	*Somatochlora tenebrosa*	Secure (Green)	S3
Aphrodite Fritillary	*Speyeria aphrodite*	Secure (Green)	S3S4
Zebra Clubtail	*Stylurus scudderi*	May Be At Risk (Orange)	S1S2
LICHENS			
Valley Oakmoss Lichen	*Evernia prunastri*	Sensitive (Yellow)	S2S3
Tattered Jellyskin Lichen	*Leptogium lichenoides*	May Be At Risk (Orange)	S1S2
Beaded Jellyskin Lichen	*Leptogium teretiusculum*	Sensitive (Yellow)	S2S3
Tree Pelt Lichen	*Peltigera collina*	Sensitive (Yellow)	S2S3
Scaly Pelt Lichen	*Peltigera lepidophora*	May Be At Risk (Orange)	S1S2
Woodland Owl Lichen	*Solorina saccata*	May Be At Risk (Orange)	S1
MAMMALS			
Cougar - Eastern population	*Puma concolor pop. 1*	Undetermined	SH
MOLLUSKS			
Triangle Floater	*Alasmidonta undulata*	Secure (Green)	S2S3
Eastern Lampmussel	*Lampsilis radiata*	Sensitive (Yellow)	S2
MONOCOTS			
Short-awned Foxtail	*Alopecurus aequalis*	Sensitive (Yellow)	S2S3
Broad-Glumed Brome	*Bromus latiglumis*	May Be At Risk (Orange)	S1
Silvery-flowered Sedge	*Carex argyrantha*	Secure (Green)	S3S4
Atlantic Sedge	*Carex atlantica ssp. capillacea*	Undetermined	S2
Bebb's Sedge	*Carex bebbii*	May Be At Risk (Orange)	S1S2
Chestnut Sedge	*Carex castanea*	May Be At Risk (Orange)	S2
Hidden-scaled Sedge	*Carex cryptolepis*	Secure (Green) Sensitive	S3?
Bristle-leaved Sedge	*Carex eburnea*	(Yellow) Secure (Green)	S3
Fernald's Hay Sedge	*Carex foenea*	Sensitive (Yellow)	S3?
Pubescent Sedge	*Carex hirtifolia*	May Be At Risk (Orange)	S2S3
Porcupine Sedge	*Carex hystericina*	Secure (Green)	S2
Hop Sedge	*Carex lupulina*	May Be At Risk (Orange)	S3
White-Tinged Sedge	*Carex peckii*	Secure (Green)	S2?
Rosy Sedge	*Carex rosea*	Sensitive (Yellow)	S3
Tender Sedge	*Carex tenera*		S1S2

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
Blunt Broom Sedge	*Carex tribuloides*	Secure (Green)	S3?
Tuckerman's Sedge	*Carex tuckermanii*	May Be At Risk (Orange)	S1
Wiegand's Sedge	*Carex wiegandii*	May Be At Risk (Orange)	S1
Sweet Wood Reed Grass	*Cinna arundinacea*	May Be At Risk (Orange)	S1
Early Coralroot	*Corallorhiza trifida*	Secure (Green)	S3
Yellow Lady's-slipper	*Cypripedium parviflorum*	Sensitive (Yellow)	S2S3
Small Yellow Lady's-Slipper	*Cypripedium parviflorum var. makasin*	Sensitive (Yellow)	S2
Yellow Lady's-slipper	*Cypripedium parviflorum var. pubescens*	Sensitive (Yellow)	S2
Showy Lady's-Slipper	*Cypripedium reginae*	May Be At Risk (Orange)	S2
Deer-tongue Panic Grass	*Dichanthelium clandestinum*	Secure (Green)	S3
Yellow Spikerush	*Eleocharis olivacea*	Sensitive (Yellow)	S2S3
Ovate Spikerush	*Eleocharis ovata*	Sensitive (Yellow)	S2?
Canada Waterweed	*Elodea canadensis*	Secure (Green)	S3?
Spreading Wild Rye	*Elymus hystrix var. bigeloviana*	May Be At Risk (Orange)	S1
Wiegand's Wild Rye	*Elymus wiegandii*	May Be At Risk (Orange)	S1
Nodding Fescue	*Festuca subverticillata*	May Be At Risk (Orange)	S1
Downy Rattlesnake-Plantain	*Goodyera pubescens*	May Be At Risk (Orange)	S2
Dudley's Rush	*Juncus dudleyi*	Sensitive (Yellow)	S2?
Greene's Rush	*Juncus greenei*	May Be At Risk (Orange)	S1S2
Woods-Rush	*Juncus subcaudatus var. planisepalus*	Sensitive (Yellow)	S3
Canada Lily	*Lilium canadense*	Sensitive (Yellow)	S2S3
Tuckerman's Panic Grass	*Panicum tuckermanii*	Sensitive (Yellow)	S2S3
Canada Rice Grass	*Piptatherum canadense*	Sensitive (Yellow)	S2
Large Purple Fringed Orchid	*Platanthera grandiflora*	Secure (Green)	S3
Hooker's Orchid	*Platanthera hookeri*	Secure (Green)	S3
Large Round-Leaved Orchid	*Platanthera macrophylla*	Sensitive (Yellow)	S2
Glaucous Blue Grass	*Poa glauca*	Sensitive (Yellow)	S2S3
Richardson's Pondweed	*Potamogeton richardsonii*	May Be At Risk (Orange)	S2S3
Flat-stemmed Pondweed	*Potamogeton zosteriformis*	Sensitive (Yellow)	S2S3
Stalked Bulrush	*Scirpus pedicellatus*	Undetermined	S1
Narrow-leaved Blue-eyed-grass	*Sisyrinchium angustifolium*	Secure (Green)	S3S4
Small Burreed	*Sparganium natans*	Secure (Green)	S3
Shining Ladies'-Tresses	*Spiranthes lucida*	May Be At Risk (Orange)	S2
Yellow Ladies'-tresses	*Spiranthes ochroleuca*	Sensitive (Yellow)	S2S3
Narrow False Oats	*Trisetum spicatum*	Secure (Green)	S3S4

Appendix 3: Special Occurrences (Ecodistrict 630)

Table 1b: Other Species of Conservation Concern (other species that are a priority for planning, management, and stewardship action)

SPECIES		DESIGNATION	
Common Name	**Scientific Name**	**Provincial General Status Rank**	**ACCDC S-Rank***
Wild Celery	*Vallisneria americana*	May Be At Risk (Orange)	S2

*Atlantic Canada Conservation Data Centre S-Ranks, where S1: extremely rare; S2: rare; S3: uncommon; S4: usually widespread, fairly common; S5: widespread, abundant; S#S#: A range between two consecutive ranks for a species/community denotes uncertainty about the exact rarity (e.g. S1S2); Consult http://www.accdc.com/en/ranks.html for descriptions of other ranks.

Provincial General Status Ranks as assessed in 2010 (http://www.wildspecies.ca/wildspecies2010).

Appendix 3: Special Occurrences (Ecodistrict 630)
Table 1c – Other Conservation Features

Feature	Type	Information Source	Legislation or Status Ranking System
IBP Sites- South Maitland, Meander River	Habitat	Provincial Database	
Aggregate Pit- West St. Andrews	Feature	Local	
Shaw Aggregate	Feature	Local	
ARDA Dam - Upper Musquodoboit	Feature	Local	
Blood Worms- Cheverie, Maitland	Habitat	DFO	
Blueberry Fields- Riverside Corner	Feature	Local	
Ducks Unlimited Project	Habitat	Provincial Database	NS Environment
Dulse Harvest- Cheverie	Habitat	Local	
Education Woodlot- Chaswood	Feature	Local	
Fish Weirs- Cheverie	Habitat	DFO	
Natural Gas Storage- Alton	Feature	Local	
Hydroelectric Dam- St. Croix	Feature	Local	
Limestone Quarry	Feature	Local	
MacDonald Peat Bog	Ecosystem	IRM	
Abandoned Mines- Gypsum- Windsor, Barite-Walton, Lead-zinc-Gays River	Feature	Local	
Salt marsh	Ecosystem	Provincial Database	
Underground Aquifer	Feature	Local	
White-tailed Deer Wintering Area	Habitat	Provincial Database	
Bald Eagle Nest	Habitat	Provincial Database	NS Wildlife Act
Black Cherry - Kennetcook	Species	Local	
Bog Willow	Species	Provincial Database	
Brook Floater	Species	Provincial Database	
Brown Trout	Species	Provincial Database	Wildlife Act
Red Oak	Species	Provincial Database	
Shorebirds (unclassified)	Species	Provincial Database	Migratory Birds Convention Act
Smallmouth Bass	Species	Provincial Database	Wildlife Act
Tomcod	Species	Provincial Database	Wildlife Act
Hayes Cave	Habitat	Provincial Database	Wildlife Act
Eastern Habitat Joint Venture Lands Green Creek, Otter Brook, Akins Marsh, Elderbank	Habitat		
Aboriginal Lands - Indian Brook, Truro, Millbrook		Provincial Database	
Shubenacadie Wildlife Management Area	Habitat	Provincial Database	NS Wildlife Act
Protected Beaches - Bramber, Cheverie	Habitat	Provincial Database	Beaches Protection Act
Designated Provincial Parks and Park Reserve - Anthony, Smileys, Oakfield, Musquodoboit Provincial parks	Park	Provincial Database	Provincial Parks Act

Appendix 3: Special Occurrences (Ecodistrict 630) **Table 1c – Other Conservation Features**			
Operational Non-Designated Parks and Reserves - South Maitland, Caddell Rapids Look Off, Cheverie, Mount William, Shubenacadie, Elderbank, St. Croix, Horne Settlement, Shubenacadie Canal, Gibraltar Rock	Recreation, Ecosystem	Provincial Database	
Southern Bight-Minas Basin RAMSAR site	Ecosystem	Provincial Database	Migratory Birds Convention Act

Appendix 3: Special Occurrences (Ecodistrict 630) **Table 1d – Heritage Features**		
Feature	**Type**	**Information Source**
Cemetery- Cogmagun, Stanley	Heritage	Local Source

Appendix 3: Special Occurrences

Table 2: Comparison of Ecological Emphasis Classification Index by Ecosection (Within Ecodistrict and Ecoregion)

Ecosections that form 2% or less of the ecodistrict and/or ecoregion area or are more than 75% converted are highlighted. The table provides a sense of how unique or uncommon an ecosection and its associated climax communities are within the ecodistrict and across the ecoregion. The EEC Index value conveys an indication of relative land use pressure on the ecosection.

Ecosection	Climax Type	Ecodistrict Occurrence						Ecoregion Occurrence					
		Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted	Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted
		Ha	%	Ha	%			Ha	%	Ha	%		
DKLD	dykeland	3,980	1.5	0	0.0	18 to 19	74.5	13,132	3.2	0	0.0	12	83.2
ICHO	bS	4,181	1.5	47,893	17.7	52 to 58	21.9	6,378	1.6	66,716	16.4	42 to 46	36.8
ICSM	bS wP	879	0.3	14,766	5.5	49 to 54	26.2	13,275	3.3	24,911	6.1	35 to 36	49.2
IFDM	sM yB Be	329	0.1	15,425	5.7	49 to 68	8.7	329	0.1	19,831	4.9	48 to 67	8.7
IFHO	rS	56,239	20.8	63,701	23.6	55 to 64	12.8	63,358	15.6	63,927	15.7	51 to 60	17.4
IFKK	rS eH yB	44,013	16.3	45,218	16.7	49 to 57	21.1	44,100	10.8	45,218	11.1	48 to 57	21.2
IFRD	rP bS wP	24,768	9.2	24,768	9.2	57 to 73	2.7	24,768	6.1	24,768	6.1	57 to 73	2.7
IFSM	bS wP	15,684	5.8	14,766	5.5	52 to 58	22.8	20,523	5.0	24,911	6.1	46 to 51	31.1
IMHO	rS	17,553	6.5	63,701	23.6	53 to 65	13.0	34,807	8.6	63,927	15.7	46 to 56	20.7
IMRD	rS	8,356	3.1	63,701	23.6	53 to 73	2.5	8,356	2.1	63,927	15.7	53 to 72	2.5
IMSM	aE sM wA	10,488	3.9	9,149	3.4	44 to 49	33.2	16,842	4.1	15,452	3.8	42 to 46	36.2
PFHO	bS	3,985	1.5	47,893	17.7	61 to 74	1.1	3,985	1.0	66,716	16.4	61 to 74	1.1
WCHO	bS wP	1,779	0.7	14,766	5.5	31 to 36	50.0	17,090	4.2	24,911	6.1	32 to 35	48.2

*Area of Climax Type refers to the total area of the climax community in the ecodistrict and in the ecoregion.

Appendix 3: Special Occurrences

Table 2: Comparison of Ecological Emphasis Classification Index by Ecosection (Within Ecodistrict and Ecoregion)

Ecosections that form 2% or less of the ecodistrict and/or ecoregion area or are more than 75% converted are highlighted. The table provides a sense of how unique or uncommon an ecosection and its associated climax communities are within the ecodistrict and across the ecoregion. The EEC Index value conveys an indication of relative land use pressure on the ecosection.

Ecosection	Climax Type	Ecodistrict Occurrence						Ecoregion Occurrence					
		Area of Ecosection		Area of Climax Type* (1, 2, 3)		EEC Index Ecosection	% Converted	Area of Ecosection		Area of Climax Type (1, 2, 3) *		EEC Index ecosection	% Converted
		Ha	%	Ha	%			Ha	%	Ha	%		
WCKK	rS eH yB	1,205	0.4	45,218	16.7	46 to 68	8.8	1,205	0.3	45,218	11.1	46 to 68	8.8
WCSM	aE sM wA	326	0.1	9,149	3.4	20 to 21	68.9	9,856	2.4	15,452	3.8	22 to 23	66.7
WFDM	sM yB Be	138	0.1	15,425	5.7	33 to 35	53.0	138	0.0	19,831	4.9	33 to 35	53.0
WFHO	sM yB rS	27,164	10.1	21,323	7.9	39 to 46	35.4	32,685	8.0	21,323	5.2	34 to 40	40.7
WFKK	rS eH	17,834	6.6	10,700	4.0	44 to 50	28.2	17,834	4.4	23,290	5.7	42 to 49	28.2
WFRD	sM yB rS	3,297	1.2	21,323	7.9	53 to 62	13.2	3,297	0.8	21,323	5.2	51 to 61	13.2
WFSM	aE sM wA	134	0.0	9,149	3.4	33	56.8	604	0.1	15,452	3.8	22 to 23	67.9
WMHO	rS	6,673	2.5	63,701	23.6	52 to 63	14.5	38,186	9.4	63,927	15.7	28 to 33	48.6
WMKK	sM yB Be	7,809	2.9	15,425	5.7	55 to 70	6.0	9,983	2.5	19,831	4.9	49 to 62	15.6
WMRD	rS	1,211	0.4	63,701	23.6	49 to 65	12.3	1,211	0.3	63,927	15.7	49 to 65	12.3
WTLD	wetlands	7,230	2.7	0	0.0	67 to 69	8.3	8,359	2.1	0	0.0	63 to 65	13.7

*Area of Climax Type refers to the total area of the climax community in the ecodistrict and in the ecoregion.

Appendix 4: Ecological Representivity Worksheet

Ecosystem			Crown Responsibility	Legal Reserves		Policy Reserves (including unproclaimed legal reserve proposals)		Ecological Emphasis Classification "Reserve Class"					
Ecosection	Climax Type	Area (ha)	Percent of Area on Crown (%)	Crown Area (ha)	Private Area (ha)	Crown Area (ha)	Private Area (ha)	Crown		Private		Total Reserve	
								ha	% (EcoS)	ha	% (EcoS)	ha	% (EcoS)
IFHO	rS	56,239	13.6	0	0	471	0	471	0.8	0	0.0	471	0.8
IFKK	rS eH yB	44,013	5.6	0	15	154	0	154	0.4	15	0.0	170	0.4
WFHO	sM yB rS	27,164	8.2	2	7	68	0	71	0.3	7	0.0	77	0.3
IFRD	rP bS wP	24,768	58.6	0	0	788	0	788	3.2	0	0.0	788	3.2
WFKK	rS eH	17,834	6.7	1	4	160	0	161	0.9	4	0.0	165	0.9
IMHO	rS	17,553	8.8	30	3	145	0	175	1.0	3	0.0	178	1.0
IFSM	bS wP	15,684	29.3	0	0	191	0	191	1.2	0	0.0	191	1.2
IMSM	aE sM wA	10,488	3.2	0	0	13	0	13	0.1	0	0.0	13	0.1
IMRD	rS	8,356	14.3	0	0	0	0	0	0.0	0	0.0	0	0.0
WMKK	sM yB Be	7,809	8.1	0	0	0	0	0	0.0	0	0.0	0	0.0
WTLD	wetlands	7,230	38.3	0	0	148	0	148	2.0	0	0.0	148	2.0
WMHO	rS	6,673	4.1	0	0	0	0	0	0.0	0	0.0	0	0.0
ICHO	bS	4,181	5.8	16	0	4	0	20	0.5	0	0.0	20	0.5
PFHO	bS	3,985	77.1	0	0	203	0	203	5.1	0	0.0	203	5.1
DKLD	dykeland	3,980	0.3	0	0	10	1	10	0.3	1	0.0	11	0.3
XXWA	NONE	3,974	0.0	0	0	0	0	0	0.0	0	0.0	0	0.0
WFRD	sM yB rS	3,297	28.7	0	0	0	0	0	0.0	0	0.0	0	0.0
WCHO	bS wP	1,779	0.0	0	6	0	0	0	0.0	6	0.3	6	0.3
WMRD	rS	1,211	0.1	0	3	1	0	1	0.1	3	0.2	4	0.3
WCKK	rS eH yB	1,205	35.2	0	0	0	0	0	0.0	0	0.0	0	0.0
XXMS	salt marsh	1,033	5.6	0	77	0	0	0	0.0	1	0.1	1	0.1
ICSM	bS wP	879	0.0	0	0	0	0	0	0.0	0	0.0	0	0.0
IFDM	sM yB Be	329	5.7	0	0	19	0	19	5.7	0	0.0	19	5.7
WCSM	aE sM wA	326	0.0	0	0	0	0	0	0.0	0	0.0	0	0.0
WFDM	sM yB Be	138	0.0	0	0	0	0	0	0.0	0	0.0	0	0.0
WFSM	aE sM wA	134	0.0	0	0	0	0	0	0.0	0	0.0	0	0.0
Total		**270,262**		**49**	**114**	**2,375**	**1**	**2,425**		**40**		**2,465**	

See Appendix 12b for full Ecological Emphasis worksheet.

Appendix 5: Ecodistrict Reserves and Protected Areas Summary

Legal Reserves			Policy Reserves (including unproclaimed legal proposals)		
Act Designation	Area by Ownership		Policy Program	Area by Ownership	
	Crown (ha)	Private (ha)		Crown (ha)	Private (ha)
Sites of Ecological Significance Under Moratorium	44		Old Forest	2,192	
Operational Non Designated Parks and Park Reserves	35		Designated Provincial Parks and Park Reserves	196	
Protected Beaches	1	29	Operational Non Designated Parks and Park Reserves	109	
Designated Parks and Park Reserves	10		Nova Scotia Nature Trust		1
Wilderness Areas	4				

Source: Crown Lands Forest Model Landbase Classification
Some of these programs may occur in the same area. For example, much of the Old Forest Policy forests are located in the Wilderness Areas.

Appendix 6: Description of Road Density Index

Road, trail, and utility corridors provide the background structure for transporting people and goods and are integral components of human land use. However, transportation systems are expensive and have a wide range of negative environmental impacts including, watercourse siltation, habitat fragmentation, dispersal obstruction, plant and animal mortality, exotic species invasion, loss of productive land, and an overall increase in human presence (Forman & Deblinger 2000, Reed et. al. 1996, Lindenmayer & Franklin 2002).

In order to reduce conflicts with natural systems and improve transportation safety there is clearly a need to incorporate landscape ecology into the planning of transportation networks (Forman 2004, Forman & Hersperger 1996, Spellerberg 1998). The emerging science of road ecology advocates integrating spatial analysis of the transportation system with ecological landscape analysis as a fundamental step in transportation system planning (Forman 1999, Lindenmayer & Franklin 2002, Diaz & Apostol 1992).

Efficient access systems can be strategically designed to minimize environmental impacts by incorporating factors such as harvest scheduling, life expectancy, location, road class requirements, decommissioning, and mitigation measures (Lindenmayer & Franklin 2002, Forman, 2004). Selection of transportation routes should incorporate knowledge of landscape functions to improve compatibility with natural ecosystem flows and connectivity (Forman & Hersperger, 1996). Furthermore, areas without roads and/or few roads are important for biodiversity conservation and should be considered during planning (USDA Forest Service 1999).

The GIS-based “Road Index” procedure calculates and maps the spatial influence of the transportation network. It is a management tool designed to help planners gauge the relative influence of man-made linear features within landscapes. It was designed to help integrate the transportation system into an ecological landscape analysis process. In addition to mapping, the index provides a numerical indicator of road influence that can be used to monitor temporal changes and compare different landscapes.

Main Concepts

The influence of the transportation network on the ecological landscape varies with three main factors: 1) the type of transportation feature (e.g. highway, power line, trail, etc.); 2) the density of linear features in a given area; and 3) the distance of an area from transportation features (Forman 2004, Lindenmayer & Franklin 2002, Forman & Deblinger 2000). The Road Index is a weighting of these three factors reflecting their relative influence on ecosystem function.

Road density has a well-documented influence on many factors, including wildlife movements, fragmentation, human access, hydrology, and fire patterns (Forman and Hersperger, 1996). Forman & Deblinger (2000) report great variance in road effect zones, with average cumulative effects extending 300 metres from road edges, and some impacts penetrating up to a kilometre. Consequently, Index values are determined by assessing the transportation network within a one kilometre radius. The Index algorithm is applied to a grid of one hectare squares representing the landscape in question. The calculation provides a measure of the density of the transportation network and the specific distance to the transportation features.

The resulting index values are scaled to provide a potential range of 0 to 100. For the purpose of map interpretation, these values have been grouped into benchmark ranges that reflect characteristic patterns of land use in Nova Scotia.

In Nova Scotia, as in most populated jurisdictions, transportation networks are continuously changing as new roads and utilities are constructed and unused roads and trails deteriorate. As such, any analysis of the current state of these features must be based on reasonably up-to-date data. In this province, the Geomatics Centre, administered by Service Nova Scotia and Municipal Relations, is responsible for mapping transportation features which they include in their 1:10000 topographic series mapping.

On a provincial level, this work is updated on a ten-year repeat cycle and includes changes to existing features and the delineation of new features. Before undertaking road analysis, the Geomatics Centre should be contacted to ensure that the most current data is used to calculate the Road Index values. This data should be further updated using Landsat satellite imagery to add significant new roads and utilities that are over 500 metres in length on lands currently with a remote or forest resource index value.

DNR Forestry Branch maintains a table relating the topographic series attribute coding used by the Geomatics Centre to the feature categories used in the Road Index calculations, along with ArcView programs allowing the data to be formatted correctly. An inventory of recent Landsat satellite images is also available.

Full report contained in the Ecological Landscape Analysis Guidebook
http://www.gov.ns.ca/natr/library/forestry/reports/Procedural%20Guide%20For%20Ecological%20Landscape%20Analysis.pdf

Appendix 7: Road Density Index Worksheets

Road index values for all tables are benchmarks that will be monitored over time to evaluate trends.

Table 1: Length of Access Systems and Index Weighting for Different Road Types

Road Type	Road Index Weighting	Length (km)
Trails, tracks, abandoned roads, and railways	1	2,393
Utility corridors	3	300
Gravel Roads and active railways	6	1,684
Paved streets and roads collectors	10	1,021
Highways	15	138

Table 2: Distribution of Road Index Classes

Road Index Value		Area of Ecodistrict Affected	
Indication	Range	Hectares	Percent
Remote	0 to 6	30,622	11.4
Forest Resource	7 to 15	93,557	34.6
Mixed Rural	16 to 24	76,568	28.4
Agriculture Suburban	25 to 39	59,134	21.9
Urban	40 to 100	9,970	3.7
Total		**269,840**	**100**

Table 3: Road Index Values for Each Landscape Element Type

Landscape Element	Area (ha)	Road Index
Valley Corridors	21,490	27
Tolerant Hardwood Drumlins and Hummocks	335	14
Floodplain	6,851	19
Tolerant Mixedwood Hills	71,952	13
Marshes and Grasslands	2,435	31
Tolerant Mixedwood Hummocks	37,593	14
Salt Marsh	965	26
Spruce Pine Flats	14,507	16
Red and Black Spruce Hummocks	106,770	9
Wetlands	4,552	7
Total	**267,450***	**13**

*Water is excluded from this table. Rounding, overlapping, and averaging of figures may lead to small differences in tables.

Appendix 8: Development Classes and Seral Stages

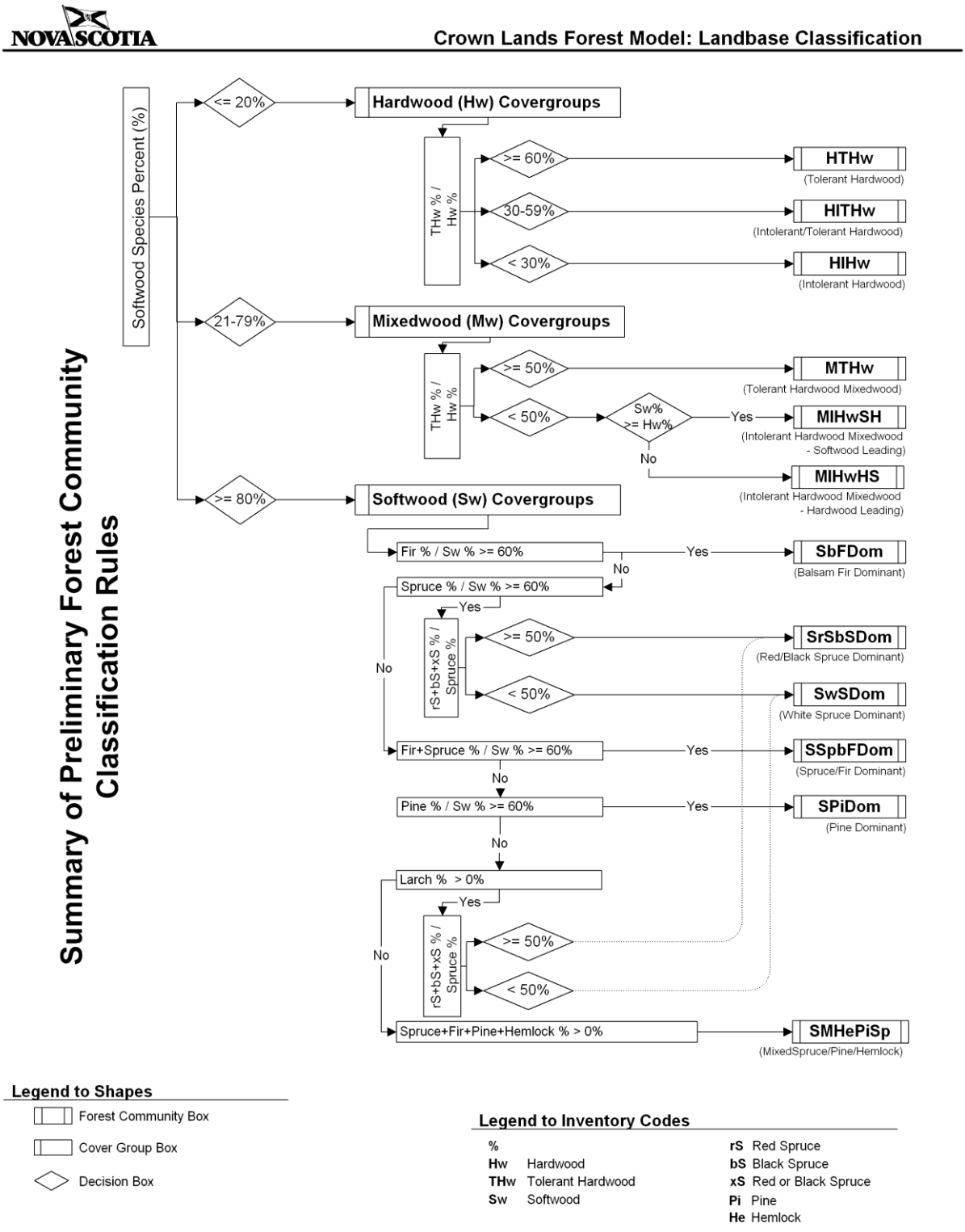
Development Class	Seral Stage
1. Forest Establishment (Height 0 to 6 m) • establishment of new growth following a stand-initiating disturbance • high diversity of forbs, shrubs, and tree regeneration, many of which are short-lived shade-intolerant "pioneer" species • peak seed production by forbs and shrubs • approximate age 0 to 25 years	Early Seral Species (Score 10 to 23) • new growth dominated by pioneer tree species or unclassified regeneration Mid seral Species (Score 24 to 37) • regeneration composed of a mixture of pioneer, mid-climax, and climax species Late Seral Species (Score 38 to 50) • regeneration dominated by climax species
2. Young Forest (Height 7 to 11 m) • young forests with developing tree canopies characterized by vigorous self-thinning and crown differentiation • early tree seed production, no understory development • approximate age 25 to 40 years	Early Seral Species (Score 10 to 23) • canopy dominated by pioneer tree species Mid seral Species (Score 24 to 37) • canopy composed of a mixture of pioneer, mid-climax, and climax species Late Seral Species (Score 38 to 50) • canopy dominated by climax species
3. Mature Forest (Height > 11 m) • stands dominated by upper canopy with full differentiation into dominance classes • self-thinning process reduced • tree seed production prominent and regular • individual tree mortality creates canopy gaps that are soon closed by neighbouring tree growth • increased light initiates regeneration and early understory development • approximate age 40 to 125 years	Early Seral Species (Score 10 to 23) • canopy dominated by pioneer species • over maturity initiates canopy breakup and understory development Mid seral Species (Score 24 to 37) • climax species in mixture with pioneers in the overstory • often reflecting a transition to climax domination following a period of sub canopy development Late Seral Species (Score 38 to 50) • canopy dominated by climax species • over maturity initiates gap dynamic processes leading to multi-aged and old growth conditions
4. Multi-aged and old growth forest (Varying height and age and Old Growth ID) • dominant overstory exhibiting a variety of crown sizes and canopy densities • canopy gaps promote development of multi-layered understory and recruitment to overstory	Early Seral Species (Score 10 to 23) • canopy likely to break up and be replaced by developing understory Mid seral Species (Score 24 to 37) • pioneer-dominated overstory with canopy recruitment from a climax species-dominated understory Late Seral Species (Score 38 to 50) • climax species-dominated overstory maintained through gap dynamic processes

Summary of species-level seral score values by ecodistrict (Source: NSDNR - January 2014 revision)

Species		Ecodistrict																																						
Code	**Name**	**100**	**210**	**220**	**310**	**320**	**330**	**340**	**350**	**360**	**370**	**380**	**410**	**420**	**430**	**440**	**450**	**510**	**520**	**530**	**540**	**550**	**560**	**610**	**620**	**630**	**710**	**720**	**730**	**740**	**750**	**760**	**770**	**780**	**810**	**820**	**830**	**840**	**910**	**920**
AS	ash	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
BA	black ash	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
BC	black cherry	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
BE	beech	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
BF	balsam fir	5	5	5	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	5	1	1
BP	balsam poplar	1	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	3	1
BS	black spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
EC	eastern cedar	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
EH	eastern hemlock	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	exotic species	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
GB	grey birch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IH	intolerant hardwood	3	2	4	2	2	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	4	3	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2
IW	ironwood	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
JP	jack pine	2	3	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
LA	largetooth aspen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OH	other hardwood	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
OS	other softwood	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
PC	pin cherry	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RM	red maple	3	2	4	2	2	2	2	2	4	2	5	2	2	2	2	2	2	2	2	2	5	3	2	2	2	2	2	2	2	2	2	3	2	3	3	2	2	2	2
RO	oak	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
RP	red pine	3	3	3	3	3	3	3	3	3	4	3	3	3	4	3	3	3	3	4	4	4	4	4	4	4	3	4	3	3	3	4	4	3	4	4	3	3	3	3
RS	red spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
SM	sugar maple	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ST	striped maple	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TA	aspen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TH	tolerant hardwood	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
TL	eastern larch	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
UC	unclassified	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
WA	white ash	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
WB	white birch	3	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WE	white elm	2	2	4	2	4	2	2	2	2	2	2	2	2	2	2	2	4	4	4	2	2	2	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WP	white pine	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
WS	white spruce	4	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	4	1	1
XS	red and black spruce	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
YB	yellow birch	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

A look-up table assigns each species in the forest inventory a value from 1 to 5 for its position on the successional scale. The look-up table may change by ecodistrict since climax on the coast or the Cape Breton Highlands differs from inland and lowland districts. This successional value is multiplied by the species' percent in the stand to give a stand successional score. Each stand may have up to four species, and the four percentages add to 10, so the stand successional scores range from 10 to 50. These scores are subdivided into three successional categories: 10 to 23 early, 24 to 37 mid, and 38 to 50 late.

Appendix 9: Vegetation Community Classification – Forest Model



Note: 1) Exotic species (Norway Spruce, Japanese Larch, etc.) were grouped with similar native species where required.
2) Unclassified species were assigned based on supplementary information (i.e.: Wood Acquisition Program / Regional Services)

Preliminary Draft: November 14, 2006

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Lowlands 630)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Red and Black Spruce Hummocks	IFHO (50.0%) IFRD (23.0%) IMHO (15.0%) IMRD (8.0%) PFHO (4.0%)	Softwood	rS bS rP bS wP	Frequent Infrequent	106,775; 100.0	Early	1,518	1,891	2,018	727	6,154	51,315; 56.0	EARLY	17,369; 19.0
						Mid	2,250	2,806	3,893	2,598	11,546			
						Late	1,564	4,035	9,925	4,092	19,616			
						Uncl	13,998	0	0	0	13,998			
		Mixedwood				Early	1,183	945	2,827	1,432	6,386	27,350; 30.0	MID	27,450; 30.0
						Mid	1,312	1,328	6,556	4,373	13,569			
						Late	73	153	1,135	537	1,898			
						Uncl	5,497	0	0	0	5,497			
		Hardwood				Early	484	482	2,301	311	3,578	7,042; 8.0	LATE	22,084; 24.0
						Mid	107	196	1,838	194	2,335			
						Late	1	21	512	35	570			
						Uncl	559	0	0	0	559			
		Unclassified				Early	595	62	594	0	1,251	6,254; 6.0	UNCL	25,058; 27.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	5,003	0	0	0	5,003			
Total					**106,775***	**#ha**	**34,144**	**11,919**	**31,598**	**14,299**	**91,960**			
						%	**37.1%**	**13.0%**	**34.4%**	**15.5%**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Lowlands 630)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Tolerant Mixedwood Hills	IFKK (59.0%) WFKK (24.0%) WMKK (11.0%) ICHO (4.0%) WCKK (1.0%)	Softwood	rS eH yB rS eH bS	Infrequent	57,205; 80.0	Early	1,088	2,003	2,558	756	6,404	24,302; 45.0	EARLY	17,788; 33.0
						Mid	1,144	2,041	2,472	1,153	6,809			
						Late	737	1,173	3,548	950	6,408			
						Uncl	4,682	0	0	0	4,682			
		Mixedwood				Early	1,087	974	2,661	1,428	6,150	18,532; 34.0	MID	16,383; 30.0
						Mid	863	902	3,963	1,992	7,719			
						Late	74	170	968	396	1,607			
						Uncl	3,056	0	0	0	3,056			
		Hardwood	sM yB Be aE sM wA	Gap	14,792; 20.0	Early	626	482	2,679	435	4,221	7,002; 13.0	LATE	8,503; 16.0
						Mid	99	123	1,444	189	1,855			
						Late	20	5	438	27	489			
						Uncl	436	0	0	0	436			
		Unclassified				Early	687	63	263	0	1,013	4,085; 8.0	UNCL	11,247; 21.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	3,071	2	0	0	3,073			
Total					**71,998***	**#ha**	**17,668**	**7,936**	**20,993**	**7,324**	**53,922**			
						%	**32.8%**	**14.7%**	**38.9%**	**13.65**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Lowlands 630)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Tolerant Mixedwood Hummocks	WFHO (70.0%) WMHO (18.0%) WFRD (9.0%) WMRD (3.0%)	Softwood	bS rS	Frequent	15,207; 40.0	Early	170	385	968	524	2,046	9,645; 39.0	EARLY	8,245; 33.0
						Mid	214	386	701	522	1,824			
						Late	216	391	1,755	629	2,991			
						Uncl	2,783	0	0	0	2,783			
		Mixedwood	sM yB rS	Infrequent	20,863; 55.0	Early	319	351	1,119	974	2,764	9234; 36.0	MID	7,316; 29.0
						Mid	275	387	2,105	1,551	4,318			
						Late	6	32	424	179	642			
						Uncl	1,511	0	0	0	1,511			
		Hardwood	sM yB Be	Gap	1,566; 4.0	Early	332	453	1,545	496	2,826	4,472; 18.0	LATE	3,894; 16.0
						Mid	54	75	758	288	1,174			
						Late	0	0	232	30	262			
						Uncl	211	0	0	0	211			
		Unclassified				Early	373	12	226	0	610	1,730; 7.0	UNCL	5,625; 22.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	1,120	0	0	0	1,120			
Total					**37,637***	**#ha**	**7,583**	**2,473**	**9,833**	**5,193**	**25,082**			
						%	**30.2%**	**9.9%**	**39.2%**	**20.7%**	**100.0%**			

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Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Lowlands 630)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Spruce Pine Flats	IFSM (83.0%) WCHO (11.0%) ICSM (6.0%)	Softwood	bS wP rS eH wP	Frequent	11,939; 82.0	Early	84	150	267	94	595	6,273; 67.0	EARLY	1,515; 16.0
						Mid	67	308	388	264	1,027			
						Late	146	647	1,638	939	3,370			
						Uncl	1,282	0	0	0	1,282			
		Mixedwood				Early	49	27	210	196	482	2,248; 24.0	MID	2,467; 26.0
						Mid	103	105	623	428	1,259			
						Late	1	11	154	43	208			
						Uncl	300	0	0	0	300			
		Hardwood				Early	18	76	192	60	346	623; 6.0	LATE	3,661; 39.0
						Mid	3	32	111	36	182			
						Late	0	0	74	9	83			
						Uncl	11	0	0	0	11			
		Unclassified				Early	73	0	20	0	93	280; 3.0	UNCL	1,779; 19.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	186	0	0	0	186			
Total					**14,512***	**#ha**	**2,324**	**1,356**	**3,676**	**2,068**	**9,425**			
						%	**24.7%**	**14.4%**	**39.0%**	**21.9%**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Lowlands 630)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Valley Corridors	IMSM (19.0%) IFSM (17.0%) IFHO (14.0%) WTLD (12.0%) IFKK (8.0%) DKLD (7.0%) IMHO (5.0%) ICHO (5.0%) WFHO (3.0%)	Softwood	bS bS wP rS	Frequent	11,866; 55.0	Early	128	365	354	181	1,028	893; 67.0	EARLY	1,742; 24.0
						Mid	215	401	512	405	1,533			
						Late	98	417	877	370	1,762			
						Uncl	570	0	0	0	570			
		Mixedwood	sM yB rS	Infrequent	441; 2.0	Early	55	60	219	121	455	1,566; 22.0	MID	2,564; 35.0
						Mid	65	152	397	223	837			
						Late	5	6	116	52	179			
						Uncl	96	0	0	0	96			
		Hardwood	aE sM wA	Gap	3,071; 14.0	Early	29	32	123	49	233	542; 7.0	LATE	2,045; 28.0
						Mid	6	8	125	57	195			
						Late	0	0	97	8	105			
						Uncl	9	0	0	0	9			
		Unclassified				Early	20	0	7	0	26	257; 4.0	UNCL	906; 13.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	231	0	0	0	231			
Total					**21,698***	**#ha**	**1,526**	**1,439**	**2,826**	**1,467**	**7,258**			
						%	**21.0%**	**19.8%**	**38.9%**	**20.2%**	**100.0%**			

Left side of table refers to "potential" forest, interpreted from the Ecological Land Classification. Right side refers to "current" forest condition, summarized from inventory in the Forest Model. All multi-aged stands can be considered mature and added to mature totals. *Total area of element.

Appendix 10: Table 1: Forest Landscape Composition Worksheet (Central Lowlands 630)

Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Floodplain	IMSM (94.0%) WCSM (4.0%) WFSM (2.0%)	Softwood	bS	Frequent	2,565; 37.0	Early	94	159	358	60	672	3,010; 69.0	EARLY	997; 23.0
						Mid	17	171	275	213	676			
						Late	74	250	526	249	1,098			
						Uncl	564	0	0	0	564			
		Mixedwood				Early	26	28	90	59	202	985; 22.0	MID	1,175; 27.0
						Mid	6	70	226	104	406			
						Late	0	16	62	48	127			
						Uncl	250	0	0	0	250			
		Hardwood	aE sM wA	Gap	3,559; 52.0	Early	15	16	41	17	89	231; 5.0	LATE	1,269; 28.0
						Mid	2	11	56	24	92			
						Late	0	2	37	6	44			
						Uncl	6	0	0	0	6			
		Unclassified				Early	8	2	25	0	34	167; 4.0	UNCL	953; 22.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	133	0	0	0	133			
Total					**6,854***	**#ha**	**1,195**	**723**	**1,697**	**779**	**4,394**			
						%	**27.2%**	**16.5%**	**38.6%**	**17.7%**	**100.0%**			

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Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Wetlands	WTLD	Softwood	bS	Open Seral	1,366; 30.0	Early	4	63	76	9	153	1,380; 77.0	EARLY	264; 14.0
						Mid	10	56	76	62	203			
						Late	50	270	405	167	892			
						Uncl	133	0	0	0	133			
		Mixedwood				Early	4	11	22	23	59	325; 18.0	MID	427; 24.0
						Mid	16	25	102	51	193			
						Late	0	1	38	15	54			
						Uncl	19	0	0	0	19			
		Hardwood	aE sM wA	Open Seral	910; 20.0	Early	0	6	31	5	42	79; 4.0	LATE	951; 53.0
						Mid	0	5	24	2	31			
						Late	0	0	4	1	5			
						Uncl	2	0	0	0	2			
		Unclassified				Early	3	0	7	0	10	20; 1.0	UNCL	163; 9.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	11	0	0	0	11			
Total					**4,552***	**#ha**	**250**	**437**	**782**	**336**	**1,805**			
						%	**13.9%**	**24.2%**	**43.3%**	**18.6%**	**100.0%**			

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Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Tolerant Hardwood Drumlins and Hummocks	IFDM (75.0%) WFDM (25.0%)	Softwood				Early	5	32	13	0	50	209; 77.0	EARLY	52; 19.0
						Mid	0	36	4	5	44			
						Late	0	31	10	1	42			
						Uncl	73	0	0	0	73			
		Mixedwood				Early	0	0	0	0	0	56; 21.0	MID	57; 21.0
						Mid	0	5	8	0	13			
						Late	0	0	0	0	0			
						Uncl	42	0	0	0	42			
		Hardwood	sM yB Be	Gap	335; 100.0	Early	0	0	0	0	0	0.2; 0.1	LATE	42; 16.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	0	0	0	0	0			
		Unclassified				Early	0	0	2	0	2	6; 2.0	UNCL	119; 44.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	5	0	0	0	5			
Total					**335***	**#ha**	**124**	**104**	**36**	**6**	**271**			
						%	**45.8%**	**38.5%**	**13.3%**	**2.4%**	**100.0%**			

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							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Marshes and Grasslands	DKLD (100.0%)	Softwood			N/A	Early	0	3	4	12	19	67; 19.0	EARLY	133; 37.0
						Mid	0	4	8	11	23			
						Late	0	0	5	5	10			
						Uncl	16	0	0	0	16			
		Mixedwood		Open Seral	N/A	Early	4	6	19	21	50	150; 42.0	MID	151; 42.0
						Mid	1	4	52	29	86			
						Late	0	0	6	4	10			
						Uncl	4	0	0	0	4			
		Hardwood			N/A	Early	14	6	13	30	62	127; 35.0	LATE	39; 11.0
						Mid	6	0	35	2	43			
						Late	0	0	18	2	19			
						Uncl	3	0	0	0	3			
		Unclassified				Early	1	0	1	0	2	15; 4.0	UNCL	36; 10.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	13	0	0	0	13			
Total					**2,472***	**#ha**	**61**	**22**	**159**	**117**	**359**			
						%	**16.9%**	**6.2%**	**44.5%**	**32.5%**	**100.0%**			

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Element	Ecosection (% land area)	Covertype	Climax Species (M=Mid; L=Late Seral)	Natural Disturbance Regime	Total Land Area of Potential Forest* (ha; %)	Seral Stage	Current Forest - GIS Inventory							
							Development Class (ha)				Total Forested Area (ha)	Covertype (ha; %)	Seral Stage Summary (ha; %)	
							Establish-ment (1)	Young Forest (2)	Mature Forest (3)	Multi-aged (4)				
Salt Marsh	XXMS	Softwood			N/A	Early	0	0	25	9	34	57; 21.0	EARLY	181; 67.0
						Mid	0	3	3	5	11			
						Late	0	0	10	0	10			
						Uncl	2	0	0	0	2			
		Mixedwood			N/A	Early	3	5	39	26	73	110; 40.0	MID	57; 21.0
						Mid	0	0	27	2	29			
						Late	0	0	3	0	3			
						Uncl	5	0	0	0	5			
		Hardwood			N/A	Early	3	3	40	28	74	100; 37.0	LATE	20; 7.0
						Mid	0	0	14	3	18			
						Late	0	0	7	0	7			
						Uncl	1	0	0	0	1			
		Unclassified				Early	0	0	0	0	0	5; 2.0	UNCL	14; 5.0
						Mid	0	0	0	0	0			
						Late	0	0	0	0	0			
						Uncl	5	0	0	0	5			
Total					**1,025***	**#ha**	**20**	**11**	**168**	**73**	**272**			
						%	**7.3%**	**4.1%**	**61.7%**	**26.9%**	**100.0%**			

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Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Red and Black Spruce Hummocks	ICHO IFHO IFKK IFRD IFSM IMHO IMRD IMSM PFHO WMHO WMKK WTLD	FREQ INFREQ INFREQ FREQ FREQ FREQ FREQ GAP FREQ FREQ GAP NONE	bS rS rS eH yB rP bS wP bS wP rS rS aE sM wA bS rS sM yB Be	S	SrSbSDom	34,173	39.9%	L	**Well-drained** Early VT: gB, tA, wB, rM Mid VT: rP, wP, bS Late VT: bS, wP **Moist** Early VT: tA, bS Mid VT: bS, rP, wP Late VT: bS, wP **Wet: All VT's** wetlands, bS, tL
				S	SbFDom	6,691	7.8%	E	
				S	SspbFDom	6,783	7.9%	M	
				S	SwSDom	1,515	1.8%	E	
				S	SpiDom	1,040	1.2%	L	
				S	SMHePiSp	1,113	1.3%	L	
				M	MIHwSH	16,995	19.8%	E/M	
				M	MTHw	1,015	1.2%	L	
				M	MIHwHS	9,340	10.9%	E/M	
				H	HTHw	700	0.8%	L	
				H	HIHw	5,638	6.6%	E/M	
				H	HITHw	705	0.8%	M/L	
Total						**85,708**	**100.0%**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Tolerant Mixedwood Hills	DKLD ICHO IFHO IFKK IFRD IMHO IMSM WCKK WFKK WMHO WMKK	NONE FREQ INFREQ INFREQ FREQ FREQ GAP INFREQ GAP FREQ GAP	Dykeland bS rS rS eH yB rP bS wP rS aE sM wA rS eH yB rS eH rS sM yB Be	S	SrSbSDom	11,071	25.0%	L	**Moist** Early VT: wB, rM, tA, bF Mid VT: bF, rS LateVT: rS, eH **Well-drained** Early VT: wB, rM, tA, bF Mid VT: bF, rS Late VT: rS, eH
				S	SbFDom	5,387	12.2%	E	
				S	SspbFDom	4,361	9.9%	M	
				S	SwSDom	2,925	6.6%	E	
				S	SpiDom	150	0.3%	L	
				S	SMHePiSp	407	0.9%	L	
				M	MTHw	1,228	2.8%	L	
				M	MIHwSH	10,779	24.4%	E/M	
				M	MIHwHS	6,524	14.7%	E/M	
				H	HTHw	683	1.5%	L	
				H	HIHw	734	1.7%	E/M	
Total						**44,249**	**100.0%**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Tolerant Mixedwood Hummocks	DKLD IFSM IMSM WFHO WFRD WMHO WMRD	NONE FREQ GAP INFREQ INFREQ FREQ INFREQ	Dykeland bS wP aE sM wA sM yB rS sM yB rS rS rS	S	SwSDom	1,275	5.5%	E	**Well/Moist** Early VT: wB, rM, tA, bF Mid VT: bF,rS Late VT: rS, eH **Wet all VT's** wetlands, bS, tL
				S	SbFDom	1,158	5.0%	E	
				S	SrSbSDom	4,941	21.2%	M	
				S	SspbFDom	1,869	8.0%	M	
				S	SMHePiSp	282	1.2%	L	
				S	SpiDom	117	0.5%	L	
				M	MIHwSH	4,916	21.1%	E/M	
				M	MTHw	436	1.9%	L	
				M	MIHwHS	3,881	16.6%	E/M	
				H	HIHw	3,847	16.5%	E/M	
				H	HTHw	293	1.3%	L	
				H	HITHw	332	1.4%	M/L	
Total						**23,347**	**100.0%**		

*Forest Community Codes:	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Spruce Pine Flats	ICHO ICSM IFHO IFKK IFSM WCHO WCSM	FREQ FREQ INFREQ INFREQ FREQ FREQ GAP	bS bS wP rS rS eH yB bS wP bS wP aE sM wA	S	SwSDom	142	1.6%	E	**Moist/Wet** Wetlands, bS, tL, aE/wA/sM (isolated patches) **Well-drained** Early VT: rM, wB, tA Mid VT: bS Late VT: bS, wP
				S	SrSbSDom	4,574	50.0%	M	
				S	SbFDom	473	5.2%	E	
				S	SspbFDom	406	4.4%	M	
				S	SMHePiSp	443	4.9%	L	
				S	SpiDom	235	2.6%	L	
				M	MTHw	98	1.1%	L	
				M	MIHwSH	1,448	15.8%	E/M	
				M	MIHwHS	701	7.7%	E/M	
				H	HTHw	85	0.9%	L	
				H	HIHw	504	5.5%	E/M	
				H	HITHw	34	0.4%	M/L	
Total						**9,143**	**100.0%**		

*Forest Community Codes:			
SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Valley Corridors	DKLD ICHO ICSM IFDM IFHO IFKK IFRD IFSM IMHO IMRD IMSM WCHO	NONE FREQ FREQ GAP INFREQ INFREQ FREQ FREQ FREQ FREQ GAP FREQ	Dykeland bS bS wP sM yB Be rS rS eH yB rP bS wP bS wP rS rS aE sM wA bswP	S	SrSbSDom	2,746	39.2%	M	all
				S	SbFDom	765	10.9%	E	
				S	SspbFDom	983	14.0%	M	
				S	SwSDom	284	4.1%	E	
				S	SpiDom	31	0.4%	L	
				M	MTHw	140	2.0%	L	
				M	MIHwSH	992	14.2%	E/M	
				M	MIHwHS	433	6.2%	E/M	
				H	HTHw	113	1.6%	L	
				H	HIHw	338	4.8%	E/M	
				H	HITHw	91	1.3%	M/L	
Total						**7,001**	**100.0%**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Floodplain	IFSM IMSM WCSM WFSM	FREQ GAP GAP GAP	bS wP aE sM wA aE sM wA aE sM wA	S	SrSbSDom	1,688	39.7%	M	**Wet** wetlands, bS, tl, bAsh, rM **Well-drained** Early VT: bCherry, wS, tA, rM Mid VT: wA, sM Late VT: sM, aE
				S	SwSDom	143	3.4%	E	
				S	SbFDom	654	15.4%	E	
					SPiDom	25	0.6%	L	
				S	SspbFDom	479	11.3%	M	
				S	SMHePiSp	22	0.5%	L	
				M	MTHw	92	2.2%	L	
				M	MIHwSH	558	13.1%	E/M	
				M	MIHwHS	335	7.9%	E/M	
				H	HTHw	45	1.1%	L	
				H	HIHw	142	3.3%	E/M	
				H	HITHw	44	1.0%	M/L	
Total						**4,252**	**100.0%**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Wetlands	WTLD	Open seral	bS aE sM wA	S	SrSbSDom	1,178	66.0%	M	wetlands, bS, tL aE/wA/sM (isolated patches)
				S	SbFDom	59	3.3%	E	
				S	SspbFDom	57	3.2%	M	
				S	SMHePiSp	40	2.3%	L	
				S	SwSDom	17	0.9%	E	
				S	SpiDom	30	1.7%	L	
				M	MTHw	32	1.8%	L	
				M	MIHwSH	169	9.5%	E/M	
				M	MIHwHS	125	7.0%	E/M	
				H	HTHw	5	0.5%	L	
				H	HIHw	68	3.8%	E/M	
				H	HITHw	7	0.4%	M/L	
Total						**1,785**	**100**		

*Forest Community Codes:			
	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Tolerant Hardwood Drumlins and Hummocks	IFDM	Gap	sM yB Be	S	SrSbSDom	130	49.3%	M	
				S	SbFDom	36	13.5%	E	
				S	SspbFDom	28	10.5%	M	
	WFDM	Gap	sM yB Be	S	SwSDom	15	5.6%	E	
				M	MIHwSH	50	18.8%	E/M	
				M	MIHwHS	6	2.3%	E/M	
Total						**266**	**100.0%**		

*Forest Community Codes:	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Marshes and Grasslands	DKLD	None	Open Seral	S	SrSbSDom	28	8.1%	M	
				S	SwSDom	17	4.9%	E	
				S	SSpbFDom	15	4.4%	M	
				S	SMHePiSp	4	1.1%	L	
				S	SbFDom	4	1.0%	E	
				M	MIHwSH	81	23.6%	E/M	
				M	MIHwHS	64	18.7%	E/M	
				M	MTHw	4	1.1%	L	
				H	HIHw	80	23.3%	E/M	
				H	HITHw	27	7.8%	M/L	
				H	HTHw	21	6.0%	L	
Total						**344**	**100.0%**		

*Forest Community Codes:	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10: Table 2: Composition of Forest Communities (in Central Lowlands Grouped by Landscape Element)

Element	Ecosections	Dominant NDR	Dominant Climax Type	Covertype	Forest* Community (Crown Model)	Area (ha)	Percent of Forest Community	Successional Stage	Successional Types
Salt Marsh	XXSM	Open Seral		S	SwSDom	34	12.9%	E	
				S	SrSbSDom	17	6.2%	M	
				S	SSpbFDom	5	1.7%	M	
				S	SbFDom	1	0.4%	E	
				M	MIHwHS	61	22.7%	E/M	
				M	MIHwSH	47	17.5%	E/M	
				M	MTHw	3	1.0%	L	
				H	HIHw	90	33.5%	E/M	
				H	HTHw	8	2.9%	L	
				H	HITHw	3	1.2%	M/L	
Total						**267**	**100.0%**		

*Forest Community Codes:	SrSbSDom-Red Black Spruce Dominant SwSDom-White Spruce Dominant SspbFDom-Spruce Fir Dominant SbFDom-Balsam Fir Dominant	SpiDom-Pine Dominant SMHePiSp-Mixed Spruce Pine Hemlock MIHwSH-Intolerant Hardwood Mixedwood S MIHwHS-Intolerant Hardwood Mixedwood H	MTHw-Tolerant Hardwood Mixedwood HIHw-Intolerant Hardwood HTHw-Tolerant Hardwood HITHw-Intolerant Tolerant Hardwood

Appendix 10:
Table 3: Summary of "Potential Climax" Forest Abundance
(Based on ELC Interpretations)

Climax Type	Ecodistrict		Ecoregion	
	Hectares	Percent	Hectares	Percent
rS	63,700	24.0%	63,927	16.0%
bS	47,893	18.0%	66,716	16.0%
rS eH yB	45,218	17.0%	45,218	11.0%
rP bS wP	24,768	9.0%	24,768	6.0%
sM yB rS	21,322	8.0%	21,323	5.0%
sM yB Be	15,425	6.0%	19,830	5.0%
bS wP	14,765	5.0%	24,910	6.0%
rS eH	10,700	4.0%	23,290	6.0%
aE sM wA	9,148	3.0%	15,451	4.0%
RS eH wP	264	<1.0%	36,557	9.0%
Total	**253,203**	**94.0%***	**341,990**	**84.0%****

*Total does not add up to 100% because wetlands not added.
**Total does not add up to 100% because not all climax vegetation types in region are found in this ecodistrict
Source: Crown Lands Forest Model Landbase Classification.

Appendix 11: Ecological Emphasis Classes and Index Values

The classification includes all upland conditions, both forested and non-forested, under all types of administration and land use practices. It does not include water or other non-terrestrial conditions.

Ecological Emphasis Class	Conservation Factor	Description
Reserve	**1**	• Reserved lands which meet biodiversity conservation goals through preservation of natural conditions and processes. Resource management activities are not usually permitted except where required to perpetuate desired natural conditions. This class is assigned based on the types of laws and policies governing the management (for example: Wilderness, Parks, Conservation Easement, Old Forest Policy).
Extensive	**0.75**	• Lands managed for multiple values using ecosystem-based techniques that conserve biodiversity, and natural ecosystem conditions and processes. • Forestry practices employ ecosystem-based prescriptions which consider natural disturbance regimes, successional trends, structure, and composition. Natural regeneration is favoured to provide the next forest. Practices may include protection from fire and insects. • Management complies with the Forest Code of Practice, and excludes the use of herbicides, exotic tree species, off-site native species, genetically modified organisms, and stand conversion.
Intensive	**0.25**	• Lands managed intensively to optimize resource production from sites maintained in a native state (e.g. forested). Despite intensive practices these lands are an important component of landscape structure and composition. • Management may eliminate or reduce the duration of some development processes, particularly mature old forest stages, and may result in non-natural succession. Practices may produce unnatural conditions such as exotic species, old field spruce, and monoculture plantations, or reduce structure and composition below ecologically desirable levels. Forests are protected from fire, insects, and competing vegetation. • Management adheres to environmental regulations and policies such as the Wildlife Habitat and Watercourse Protection Regulations and Forest Code of Practice.
Converted	**0**	• Land converted to an unnatural state for human use or areas where practices have significantly degraded site productivity (e.g. agriculture, urban development roads, Christmas trees, seed orchards, forest soil compaction).

Appendix 12a: Ecological Emphasis Index Worksheet – Elements

Landscape Element	Total Land Area (ha)	Ecological Emphasis Classes					Ecological Emphasis Index	
		Reserve Area (ha)	Extensive Forest Management Area (ha)	Intensive Forest Management Area (ha)	Conversion to Non-Forest Area (ha)	Unclassified Land Use Area (ha)	Effective Area Range (ha)	EEC Index Range
Red and Black Spruce Hummocks	106,740	1,636	67,498	2,003	8,502	27,101	59,536 to 73,087	56 to 68
Tolerant Hardwood Hills	71,981	277	41,128	3,004	14,902	12,670	35,041 to 41,376	49 to 57
Tolerant Mixedwood Hummocks	37,623	76	18,811	1,574	10,889	6,273	16,146 to 19,283	43 to 51
Valley Corridors	20,102	195	10,135	345	8,493	934	8,116 to 8,583	40 to 43
Spruce Pine Flats	14,499	130	9,068	191	3,122	1,988	7,476 to 8,470	52 to 58
Floodplain	6,844	0	4,087	189	1,556	1,012	3,366 to 3,872	49 to 57
Wetlands	4,550	148	4,096	15	116	175	3,267 to 3,355	72 to 74
Marshes and Grasslands	2,472	1	509	33	1,891	38	400 to 419	16 to 17
Tolerant Hardwood Drumlins and Hummocks	335	0	141	15	58	121	140 to 201	42 to 60
Salt Marsh	1,026	1	660	55	296	14	513 to 520	50 to 51
Total	**266,172**	**2,464**	**156,133**	**7,424**	**49,825**	**50,326**	**134,003 to 159,167**	**50 to 60**

These classes have been given a weighting percentage representing their ecological emphasis level: Reserve (100), Extensive (75), Intensive (25), and Converted (0). These percentages are applied to the area of land in each class to determine the "effective area" which is divided by "total area" to calculate the index.

The Unclassified land is too young to determine if it is being managed extensively or intensively. Therefore, an EEI range is reported based on it being all one or the other.

Water was not included as an element type. Areas were rounded to the nearest hectare.

EEI values are benchmarks that will be monitored over time.

Appendix 12b: Ecological Emphasis Index Worksheet – Ecosections

Ecosection	Total Land Area (ha)	Ecological Emphasis Classes					Ecological Emphasis Index	
		Reserve Area (ha)	Extensive Forest Management Area (ha)	Intensive Forest Management Area (ha)	Conversion to Non-Forest Area (ha)	Unclassified Land Use Area (ha)	Effective Area Range (ha)	EEC Index Range
DKLD	3,980	11	907	48	2,964	50	716 to 741	18 to 19
ICHO	4,181	20	2,696	59	915	491	2,180 to 2,425	52 to 58
ICSM	879	0	544	19	230	86	434 to 477	49 to 54
IFDM	329	19	144	15	28	123	161 to 223	49 to 68
IFHO	56,238	471	36,385	1,388	7,222	10,772	30,800 to 36,186	55 to 64
IFKK	44,013	170	25,518	1,628	9,294	7,403	21,566 to 25,268	49 to 57
IFRD	24,768	788	14,823	195	677	8,285	14,025 to 18,168	57 to 73
IFSM	15,684	191	9,909	162	3,573	1,849	8,125 to 9,050	52 to 58
IMHO	17,552	178	10,760	341	2,278	3,995	9,332 to 11,330	53 to 65
IMRD	8,355	0	4,769	81	206	3,299	4,422 to 6,072	53 to 73
IMSM	10,489	13	5,647	241	3,481	1,107	4,585 to 5,138	44 to 49
PFHO	3,984	203	2,608	88	44	1,041	2,441 to 2,962	61 to 74
WCHO	1,779	6	656	41	889	187	555 to 648	31 to 36
WCKK	1,205	0	552	9	106	538	551 to 820	46 to 68
WCSM	327	0	81	11	225	10	66 to 70	20 to 21
WFDM	138	0	57	0	73	8	45 to 49	33 to 35
WFHO	27,151	77	12,427	1,166	9,617	3,864	10,655 to 12,587	39 to 46
WFKK	17,835	165	9,062	1,353	5,026	2,229	7,856 to 8,971	44 to 50
WFRD	3,296	0	2,039	183	435	639	1,735 to 2,055	53 to 62
WFSM	134	0	58	0	76	0	44	32

For an explanation of calculations and other information to help better understand this table, please refer to the bottom of Appendix 12a.

Appendix 12b: Ecological Emphasis Index Worksheet – Ecosections

Ecosection	Total Land Area (ha)	Ecological Emphasis Classes					Ecological Emphasis Index	
		Reserve Area (ha)	Extensive Forest Management Area (ha)	Intensive Forest Management Area (ha)	Conversion to Non-Forest Area (ha)	Unclassified Land Use Area (ha)	Effective Area Range (ha)	EEC Index Range
WMHO	6,674	0	4,078	214	966	1,416	3,466 to 4,174	52 to 63
WMKK	7,810	0	4,983	58	469	2,300	4,327 to 5,477	55 to 70
WMRD	1,210	4	654	22	148	382	596 to 787	49 to 65
WTLD	7,232	148	6,184	55	598	247	4,861 to 4,984	67 to 69
XXMS	1,034	1	662	55	302	14	514 to 521	50
Total	**266,277**	**2,465**	**156,203**	**7,432**	**49,842**	**50,335**	**134,057 to 159,226**	**50 to 60**

For an explanation of calculations and other information to help better understand this table, please refer to the bottom of Appendix 12a.

Appendix 13:

Glossary B: Terms in Parts 1, 2, and 3

Aspect	The direction of a downhill slope expressed in degrees or as a compass point.
Atlantic Coastal Plain Flora (ACPF)	A group of 90 species of taxonomically unrelated wetland plants that inhabit lake and river shores, bogs, fens, and estuaries and which are found primarily in southwestern Nova Scotia. The distribution of this group of plants extends down the eastern coast of the USA with isolated populations in Nova Scotia and along the Great Lakes.
Biodiversity	The diversity of plants, animals, and other living organisms, in all their forms and level of organization, including genes, species, ecosystems, and the evolutionary and functional process that link them.
Canopy	The uppermost continuous layer of branches and foliage in a stand of trees.
Climax forest community	A relatively stable and self-perpetuating forest community condition that maintains itself (more or less) until stand-level disturbance causes a return to an earlier successional stage. The final stage of natural succession for its environment.
Climax vegetation	A forest or non-forest community that represents the final stage of natural succession for its environment.
Coarse filter approach	A habitat-based approach to conserving biodiversity by maintaining a natural diversity of structures within stands, and representation of ecosystems across landscapes. The intent is to meet the habitat requirements of most native species over time. Usually combined with a fine filter approach to conserve specific rare species and ecosystems.
Coarse Woody Debris (CWD)	Dead tree stems greater than 7.5 centimetres in diameter and laying horizontally at 45 degrees or less. Provides habitat for many species and is a source of nutrients for soil development.
Commercial thinning	Silviculture treatment that “thins” out an overstocked stand by removing trees that are large enough to be sold as products, such as poles or fence posts. This treatment is carried out to improve the health and growth rate of the remaining crop trees.

Composition	The proportion of biological components within a specified unit such as a stand or landscape: **Stand or Species Composition.** The proportion of each plant species in a community or stand. May be expressed as a percentage of the total number, basal area, or volume of all species in that community. **Landscape Composition.** The proportion of each community type within a landscape. Community type may be defined by vegetation type, covertype, seral stage, or development class (age).
Connectivity	The way a landscape enables or impedes movement of resources, such as water and animals.
Converted	Lands removed from a natural state (e.g. forest) and changed to other uses (e.g. agriculture, urban, settlement, road).
Corridor	Corridors are natural linear communities or elements, such as river valleys, that link parts of the ecodistrict. They are a fundamental feature of the "matrix, patch, corridor" concept of landscape structure.
Crown land and Provincial Crown land	Used in the Ecological Landscape Analysis to include all land under the administration and control of the Minister of Natural Resources under the Forests Act, Section 3; as well as the lands under the administration and control of the Minister of Environment under the Wilderness Areas Protection Act. Also includes Federal Parks in the accounting of protected area representation.
Covertype	Refers to the relative percentage of softwood versus hardwood species in the overstory of a stand. In this guide, covertype classes are: **Softwood:** softwood species compose 75% or more of overstory **Hardwood:** hardwood species compose 75% or more of overstory **Mixedwood:** softwood species composition is between 25% and 75%
Development class	The description of the structure of forests as they age and grow (e.g. establishment forest, young forest, mature forest, multi-aged / old forest).
Disturbance	An event, either natural or human-induced, that causes a change in the existing condition of an ecological system.
Ecodistrict	The third of five levels in the Ecological Land Classification for Nova Scotia Volume 1, and a subdivision of ecoregions. Characterized by distinctive assemblages of relief, geology, landform, and vegetation. Used to define the landscape unit for these Ecological Landscape Analysis reports.

Ecological land classification	A classification of lands from an ecological perspective based on factors such as climate, physiography, and site conditions. The Ecological Land Classification for Nova Scotia Volume 1 delineates ecosystems at five hierarchical scales: ecozone, ecoregion, ecodistrict, ecosection, and ecosite.
Ecological integrity	The quality of a natural unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic, species, and ecosystem diversity assured for the future.
Ecoregion	The second level of the Ecological Land Classification for Nova Scotia Volume 1, and a subdivision of ecozone. Used to characterize distinctive regional climate as expressed by vegetation. There are nine ecoregions identified in Nova Scotia.
Ecosection	The fourth of five levels in the Ecological Land Classification for Nova Scotia Volume 1, and a subdivision of ecodistricts. An ecological land unit with a repeating pattern of landform, soils, and vegetation throughout an ecodistrict.
Ecosite	The fifth of five levels in the Ecological Land Classification for Nova Scotia Volume 1, and a subdivision of ecosections. Characterized by conditions of soil moisture and nutrient regimes. Although not mapped, the Acadian and Maritime Boreal ecosites of the province are fully described in the Forest Ecosystem Classification for Nova Scotia (2010).
Ecosystem	A functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size – a log, pond, field, forest, or the Earth's biosphere – but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation, such as a forest ecosystem, old-growth ecosystem, or range ecosystem. Can also refer to units mapped in the DNR Ecological Land Classification system.
Ecozone	The first of five levels in the Ecological Land Classification for Nova Scotia Volume 1. Ecozones are continental ecosystems characterized by the interactions of macroclimate, soils, geographic and physiographic features. The entire province is contained within the Acadian ecozone, one of 15 terrestrial ecozones in Canada.
Edge effect	Habitat conditions (such as degree of humidity and exposure to light or wind) created at or near the more-or-less well-defined boundary between ecosystems, as, for example, between open areas and adjacent forest.

Element	A landscape ecosystem containing characteristic site conditions that support similar potential vegetation and successional processes. Elements were mapped by combining ecosections with similar climax vegetation and natural disturbance interpretations. Depending on their role in the ecosystem, elements may be described as matrix, patch or corridor.
Endangered species	A wildlife species facing imminent extirpation or extinction. A species listed as endangered under the federal or Nova Scotia endangered species legislation (NS Endangered Species Act or federal Species at Risk Act).
Even-aged	A forest, stand, or vegetation type in which relatively small age differences exist between individual trees. Typically results from stand-initiating disturbance.
Extensive land use	Lands managed for multiple values using ecosystem-based techniques that conserve biodiversity and natural ecosystem conditions and processes.
Extinct species	A species that no longer exists. A species declared extinct under federal or Nova Scotia endangered species legislation (NS Endangered Species Act or federal SARA).
Extirpated species	A species that no longer exists in the wild in Nova Scotia but exists in the wild outside the province. A species declared extirpated under federal or Nova Scotia endangered species legislation (Nova Scotia Species at Risk Act or federal SARA).
Fine filter approach	An approach to conserving biodiversity that is directed toward individual species and critical ecosystems that are typically rare or threatened. This approach is usually combined with the coarse filter approach to conserving natural ranges of habitat.
Forest management	The practical application of scientific, economic, and social principles to the administration and working of a forest for specified objectives. Particularly, that branch of forestry concerned with the overall administrative, economic, legal, and social aspects and with the essentially scientific and technical aspects, especially silviculture, protection, and forest regulation.
Frequent stand initiating	Disturbances usually occur more frequently than the average lifespan of the dominant species and are of sufficient intensity to destroy most of the existing trees, promoting a new forest within relatively short periods of time.

Gap replacement	An absence of stand-initiating disturbances supports the development of a dominant overstory that is sustained through dynamic processes of canopy gap formation, understory development, and overstory recruitment. Gap formation ranges from individual tree mortality to periodic gap formation events that are rarely of a stand-initiating intensity.
Habitat	The place where an organism lives and/or the conditions of that environment including the soil, vegetation, water, and food.
Infrequent stand initiating	The time between stand-initiating disturbances is usually longer than the average longevity of dominant species, thereby supporting processes of canopy gap formation and understory development in mature forests.
Inherent conditions	Refers to the natural condition of ecosystems based on their enduring physical features. This is the potential condition expected in the absence of human influence.
Integrated Resource Management (IRM)	A decision-making process whereby all resources are identified, assessed, and compared before land use or resource management decisions are made. The decisions themselves, whether to approve a plan or carry out an action on the ground, may be either multiple or single use in a given area. The application of integrated resource management results in a regional mosaic of land uses and resource priorities which reflect the optimal allocation and scheduling of resource uses.
Intensive land use	Lands managed intensively to optimize resource production from sites maintained in a forested state.
Land capability (LC)	LC values represent the maximum potential stand productivity (m^3/ha/yr) under natural conditions.
Landform	A landscape unit that denotes origin and shape, such as a floodplain, river terrace, or drumlin.
Landscape	An expanse of natural area, comprising landforms, land cover, habitats, and natural and human-made features that, taken together, form a composite. May range in scale from a few hectares to large tracts of many square kilometres in extent.
Long range management frameworks	A strategic, integrated resource plan at the subregional level. It is based on the principles of enhanced public involvement, consideration of all resource uses and values, consensus-based decision making, and resource sustainability.

Matrix	A widespread vegetation forest community which dominates the landscape and forms the background in which other smaller scale communities (patches) occur. The most connected or continuous vegetation type within the landscape, typically the dominant element. (Matrix is a fundamental feature of the "matrix, patch, corridor" concept of landscape structure).
Mature forest	A development class within the sequence of: 1) forest establishment; 2) young forest; 3) mature forest; and 4) multi-aged and old growth. Mature forests include multi-aged and old growth. Forests are typically taller than 11 metres, have an upper canopy fully differentiated into dominance classes, and regularly produce seed crops. Mature forests may develop over long periods, transitioning from early competitive stages where canopy gaps from tree mortality soon close, to later stages where openings persist and understories develop to produce multi-aged and old growth.
Memorandum of understanding (MOU)	An agreement between ministers defining the roles and responsibilities of each ministry in relation to the other or others with respect to an issue over which the ministers have concurrent jurisdiction.
Mixed stand	A stand composed of two or more tree species.
Multiple use	A system of resource use where the resources in a given land unit serve more than one user.
Natural disturbance	A natural force that causes significant change in forest stand structure and/or composition such as fire, wind, flood, insect damage, or disease.

Natural disturbance regimes	The patterns (frequency, intensity, and extent) of fire, insects, wind, landslides, and other natural processes in an area. Natural disturbances inherently influence the arrangement of forested ecosystems and their biodiversity on a given landscape. Three disturbance regimes recognized in Nova Scotia are: **Frequent:** Disturbances which result in the rapid mortality of an existing stand and the establishment of a new stand of relatively even age. The time interval between stand-initiating events typically occurs more frequently than the longevity of the climax species that would occupy the site – therefore, evidence of gap dynamics and understory recruitment is usually absent. This regime results in the establishment and perpetuation of early to mid-successional vegetation types. **Infrequent:** Stand-initiating disturbances which result in the rapid mortality of an existing stand and the establishment of a new stand of relatively even-age, but the time interval between disturbance events is normally longer than the average longevity of the dominant species – allowing gap dynamics and understory recruitment to evolve and become evident (eventually creating uneven-aged stands). This regime generally leads to the establishment and/or perpetuation of mid to late successional vegetation types. **Gap replacement:** Stand-initiating disturbances are rare. Instead, disturbances are characterized by gap and small patch mortality, followed by understory recruitment, resulting in stands with multiple age classes. This regime generally leads to the establishment and/or perpetuation of late successional vegetation types.
Old growth	Climax forests in the late stage of natural succession, the shifting mosaic phase, marked by mature canopy processes of gap formation and recruitment from a developed understory. Typical characteristics include a multi-layered canopy of climax species containing large old trees, decadent wolf trees, and abundant snags and coarse woody debris. In Nova Scotia, stands older than 125 years are classed as old growth.
Patch	A discrete community or element nested within a surrounding landscape, which is often a matrix forest. (Patch is a fundamental feature of the “matrix, patch, corridor” concept of landscape structure.)
Pre-commercial thinning	A silviculture treatment to reduce the number of trees in young stands before the stems are large enough to be removed as a forest product. Provides increased growing space and species selection opportunities to improve future crop tree growth.

Reserve	An area of forest land that, by law or policy, is usually not available for resource extraction. Areas of land and water set aside for ecosystem protection, outdoor and tourism values, preservation of rare species, gene pool and wildlife protection (e.g. wilderness areas, parks).
Riparian	Refers to area adjacent to or associated with a stream, floodplain, or standing water body.
Road deactivation	Measures taken to stabilize roads and logging trails during periods of inactivity, including the control of drainage, the removal of sidecast where necessary, and the re-establishment of vegetation for permanent deactivation.
Seral stage	Any stage of succession of an ecosystem from a disturbed, unvegetated state to a climax plant community. Seral stage describes the tree species composition of a forest within the context of successional development.
Species	A group of closely related organisms which are capable of interbreeding, and which are reproductively isolated from other groups of organisms; the basic unit of biological classification.
Species at risk	Legally recognized designation for species at federal and/or provincial levels that reflects varying levels of threats to wildlife populations. The four categories of risk are extirpated, endangered, threatened, and species of special concern.
Succession	An orderly process of vegetation community development that over time involves changes in species structure and processes.
Threatened species	A species that is likely to become endangered if the factors affecting its vulnerability are not reversed. A species declared as threatened under the federal or Nova Scotia species at risk legislation (NS Endangered Species Act or federal SARA).
Tolerance	The ability of an organism or biological process to subsist under a given set of environmental conditions. The range of these conditions, representing its limits of tolerance, is termed its ecological amplitude. For trees, the tolerance of most practical importance is their ability to grow satisfactorily in the shade of, and in competition with, other trees.
Vernal pool	A seasonal body of standing water that typically forms in the spring from melting snow and other runoff, dries out in the hotter months of summer, and often refills in the autumn.

Vulnerable species	A species of special concern due to characteristics that make it particularly sensitive to human activities or natural activities or natural events. May also be referred to as “species of special concern.” A species declared vulnerable under the federal or Nova Scotia endangered species legislation (NS Endangered Species Act or federal SARA).
Wilderness area	A part of the provincial landbase designated under the Wilderness Areas Protection Act (e.g. Canso Barrens).

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